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U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF STATISTICS—BULLETIN NO. 27.

JOHN HYDE, Statistician.

# WHEAT PRODUCTION AND FARM LIFE

IN

# ARGENTINA.

BY

FRANK W. BICKNELL,

SPECIAL AGENT AND AGRICULTURAL EXPLORER.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1904.

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## ARGENTINE TERMS, MEASURES, ETC.

For the convenience of the reader in the United States, expressions of value, weight, capacity, distance, area, etc., have been converted into their equivalents in use in the United States. A few local terms are used, as it is difficult or impossible to preserve their meaning in translation. These terms and the ratios used in determining the United States equivalents for Argentine values are given here.

MONEY.—The Argentine gold peso, or dollar, is worth 96.5 cents United States currency, and the paper dollar is worth about 44 cents United States currency.

METRIC SYSTEM.—The metric system of weights and measures is used exclusively in Argentina, as it is the official system. Some local and old Spanish terms are still in use to some extent.

KILO.—The short word for kilogram, the metric weight, equal to 2.2046 pounds avoirdupois.

HECTOLITER.—A metric measure of capacity equal to 100 liters, or one-tenth of a cubic meter, or 2.8377 bushels. It is the standard used to express in the weight per hectoliter the weight of grain in Argentina.

TON.—The metric ton is equal to 1,000 kilos, or 2,204.6 pounds avoirdupois, or 36.74 bushels of wheat, or 11.25 barrels of flour.

HECTARE OF LAND.—2.471 acres.

SQUARE OF LAND.—4.17 acres.

LEAGUE OF LAND.—A square league, the term generally used, is equal to 6,672 acres, and the metrical league is equal to 6,178 acres.

KILOMETER.—0.621 mile.

METER.—39.37 inches.

CHACRA.—A farm devoted exclusively to general agriculture.

CHACARERO.—A man who works a chacra.

ESTANCIA.—A term peculiar to Argentina, meaning generally a large ranch, formerly devoted almost exclusively to stock raising, but now often combining stock raising with other forms of agriculture. An estancia is usually more than a square league in extent, and in the majority of cases includes several leagues.

ESTANCIERO.—The man who owns an estancia, and usually the one who operates it.

COLONIST.—The small farmer who rents or buys a small piece of land for agriculture.

ALMACEN.—The country general store, in which the farmer may buy anything he is likely to want to use on his farm and get credit for it until he sells his grain.

GUIA DE CAMPAÑA.—The provincial certificate formerly required for the movement of produce or stock, now succeeded by the "Derecha de producción," or tax on production.

PEON.—The common laborer, whether on the farm or in the city.

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# LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF STATISTICS,
*Washington, D. C., February 13, 1904.*

SIR: I have the honor to transmit herewith a report on Wheat Production and Farm Life in Argentina, the material of which was gathered and the manuscript of which was prepared by Mr. Frank W. Bicknell, special agent of this Department, while engaged in investigations in Argentina under the direction of Dr. D. E. Salmon, Chief of the Bureau of Animal Industry. As the report deals with the position of Argentina as a competitor of the United States in the production of wheat for the world's markets, it was submitted by your direction to Mr. George K. Holmes, chief of the Division of Foreign Markets of this Bureau, who, upon examination, recommends its publication. It should be designated Bulletin No. 27, Bureau of Statistics.

The writer of the report desires to acknowledge here many kindnesses and much assistance received from Argentine, North American, and English farmers, and from grain men in Argentina and from Argentine officials. Among those to whom this obligation is felt are: Dr. W. Escalante, Minister of Agriculture, Señor Don Ronaldo Tidblom, Director of the Division of Agriculture and Animal Industry in the Argentine Department of Agriculture; Mr. Walter G. Davis, Director of the National Weather Bureau; Messrs. Glynne Williams, J. Charles Pearson, John and William Benitz, Enrique B. Coffin, Norman J. Hall, J. Collett Mason, farmers; Mr. Russell Smith, inspector of hay, etc., for the British Government, now conducting a general grain inspection in Rosario, Buenos Aires, La Plata, and Bahia Blanca; Mr. William Goodwin, retired grain dealer and inspector of Argentina, now living in England; Don Carlos Lix Klett, Mr. E. G. O'Farrell, Mr. W. V. Burt and Mr. Richard Agar, of Buenos Aires; Mr. W. S. Martin, of Rosario, and Don Arturo Bab, manager of the Jewish colony at Mosesville.

Among the published authorities consulted are: Various publications of the Argentine Department of Agriculture, especially the

semimonthly bulletin and the work of Dr. E. Lahitte, chief of the Statistical Division; publications of the National Statistical Bureau, Dr. F. Latzina, director; the monthly "Anales" of the Argentine National Rural Society; "Wheat growing in Argentina," by William Goodwin, F. R. G. S.; writings of Don Carlos Lix Klett, president of the Buenos Aires Board of Trade; The Review of the River Plate, The Standard, and La Nacion, newspapers published in Buenos Aires.

Very respectfully,

EDWIN S. HOLMES, Jr.,
*Acting Chief.*

Hon. JAMES WILSON,
*Secretary of Agriculture.*

# PREFATORY NOTE.

This bulletin is a remarkable collection of facts bearing on the production of wheat in one of the four or five countries that have annually a large surplus for export.

Argentina has an extensive potential wheat area, and the rapidity with which it is to be utilized is a problem that interests both exporting and importing countries. The facts presented in this bulletin do not seem to indicate a rapid extension of acreage in the immediate future, notwithstanding some optimistic expectations in Argentina.

Among the prominent controlling factors are these: The dependence for agricultural work must be upon immigrants willing to perform arduous labor, and upon their descendants; the chief dependence is upon Italian peasants having a very low standard of living and efficiency of labor; many of the Italian immigrants return to Italy within a year after their coming, after the wheat harvest; the agricultural methods of most persons engaged in wheat raising are of a somewhat low order—they can be followed only upon virgin soil, and improvement must be slow; the stage of development in which rotation of crops is a necessity has not been reached; as in other new countries, new land will be exploited in preference as long as it lasts and is accessible; the net immigration in recent years has been about 50,000 annually—in 1902 it was 16,560, and in 1903 it was 35,359.

Land, climate, and railroad extension as required are the available potentials of an enormously expanded wheat production in Argentina; the labor is not yet assured. The phenomena of immigration presented by Argentina are different from those found on the new lands of the United States and of Canada in important particulars; the agricultural immigrants are not generally endeavoring to become owners of land and thus become permanent additions to the population and a foundation for its increase. The quality of this labor, too, is much lower than in the two North American countries. The prospect might be materially altered with a large immigration of agricultural labor of a more intelligent and effective sort for permanent residence.

GEORGE K. HOLMES,
*Chief, Division of Foreign Markets.*

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# WHEAT PRODUCTION AND FARM LIFE IN ARGENTINA.

## INTRODUCTION.

A country that can supply all its own needs and furnish bread for 14,000,000 to 17,000,000 people in other parts of the world,[a] and that is reasonably sure to increase its production largely in a few years, must be taken into consideration as an important factor in the world's food supply. Twenty years ago Argentina was not producing sufficient wheat for its own use, but in the five years 1899–1903 its yearly export averaged about 51,016,497 bushels; and even now not more than 15 or 20 per cent of the possible wheat area is employed in the production of wheat, and more than two-thirds of that, according to the best estimates obtainable, is not under cultivation. The wheat area of 1902–1903 is reported as 8,893,378 acres harvested and the area of the crop of 1903–1904 is estimated at 10,230;311 acres. Argentina has a total area of 1,135,840 English square miles, equal to all that part of the United States lying west of the line that marks the eastern boundaries of the States of Montana, Wyoming, Colorado, and the Territory of New Mexico, with the Territory of Oklahoma added. It is equal in area to all the States east of the Mississippi, with both the Dakotas, Minnesota, and Iowa added. It is 100,000 square miles larger than the great empire included in the original Louisiana pur-

[a] The wheat exports of Argentina, according to official statistics, for 1903 were 1,672,233 metric tons, equal to 61,443,414 bushels. It is commonly estimated that the United States consumes 4.66 bushels per capita per annum, not counting seed. At this rate the wheat sent out of Argentina in 1903 would feed 13,185,282 persons, not counting the flour exported, which amounted to 849,918 barrels. The rate of consumption of flour in Argentina and the United States is nearly the same, about a barrel per capita per annum, though it is a trifle more in Argentina. So the feeding capacity of Argentina may be said to be the sum of the number of barrels of flour exported added to the number of bushels of wheat divided by 4.66, or 14,035,200.

The Review of the River Plate states the Argentine wheat exports for 1903 to have been 75,270,503 bushels, or sufficient to sustain 16,066,631 persons. Added to the flour exports this would show the wheat fields of Argentine capable of feeding a population of almost 17,000,000, besides supplying the requirements of the country. The statistics of this journal are generally accepted by the grain trade in Argentina, as they are gathered from official sources and published weekly. The discrepancy between them and the official returns is not satisfactorily explained.

chase, the acquisition of which we are now about to celebrate at St. Louis, and the chief agricultural product of this vast region in the vegetable kingdom is wheat, the cultivation of which is being extended and improved every year.

The purpose of the investigation reported in this bulletin was to learn something of the producing power of Argentina, present and prospective, judged by her natural resources and methods of developing them. The subject has not hitherto been thoroughly treated in any language. Complete and reliable information is very difficult to obtain. By personal observation and investigation, by consulting many well-informed persons, officials, native and English farmers and grain men, and by studying all the available literature, both official and private, the facts herein related and the conclusions drawn therefrom have been reached. The writer spent fifteen months in Argentina, and visited various sections of the wheat-producing regions, from the south of the Province of Buenos Aires to the north of the Province of Santa Fe, seeing both the good and the bad in two harvests.

## WORK OF THE ARGENTINE DEPARTMENT OF AGRICULTURE.

The progressive department of agriculture in Argentina is doing its best to advance the condition of agriculture by showing farmers the mistakes they have made, pointing out better ways, and publishing much information of a statistical and technical character, as well as some practical bulletins. The department was established only about five years ago and is not yet perfectly organized for the collection or dissemination of information. The first issue of the semimonthly bulletin now issued by the department appeared in January, 1901. It covers the whole field of agriculture, stock raising, horticulture, forestry, viticulture, etc., and contains many valuable contributions of a practical character from competent writers, as well as much theorizing; but this and the numerous other publications of the department have a very limited circulation, because the farmers are not readers, as they are in the United States. They are mostly illiterate and not to be reached by bulletins. The population is scattered,[a] and it is difficult for the department, with its insufficient appropriations, to gather even statistical data. This also is still more difficult for a foreigner, but several European governments, including Russia, England, Germany, and France, have had or have now commissioners studying Argentine conditions. Its rapidly growing importance as a food producer and as a market for manufactured goods has drawn the eyes of the world to this great, fertile farm on the other side of the equator.

[a] The population per square mile in 1900 was estimated by the Statesman's Year-Book, from Argentine authority, to be 7.4 in the provinces and 4.3 in the entire country.

### RAPID PROGRESS IN GRAIN PRODUCTION.

Argentina is sure to take higher rank as a producer of cereals, meats, and wool. Conditions are changing for the better. Elevators are being built; the milling industry is being reorganized on a sounder basis, and large production for export is anticipated; transportation facilities are being improved; the right localities for raising wheat and corn are being more certainly determined, and improved methods are slowly being adopted.

With his great natural advantages of climate and short haul to the seaboard, the Argentine cereal producer, when he makes the best use of his opportunities, will be a very strong competitor in the world's markets. The most important question to be answered is, How soon may he be expected to develop his country fully, and when he does will the price of land increase to balance his natural advantages? Probably it will, but it is going to take many years, at the present rate of increase of farming population, to reach that point. At present, however, Argentine farmers who are well located, near to market, with cheap lands in a mild climate, are doing very well.

Some unfavorable, as well as many favorable, statements are demanded from the truthful observer in Argentina, and many unjust, as well as just, criticisms of the country have been made by visitors who have taken a hasty superficial view. For all important statements in this bulletin there is the best native authority.

### WHEAT IN THE AGRICULTURAL EXPOSITION AT BUENOS AIRES.

The Argentine Rural Society gave the first exposition devoted to general agriculture ever held in the country in Buenos Aires in May, 1903. Prior to this year the society, which is a very important and influential organization, had devoted its semi-annual expositions wholly to the live-stock interests. The May show was for horses and fat stock and the September show for pure-bred stock only. Interest in agriculture had increased to such an extent, even among stockmen, that the society decided to inaugurate an exposition devoted to the comparison of agricultural results in the country. Thousands of samples of wheat from all parts of the country were shown and some significant and striking revelations were made, pointing the direction in which wheat production is going.

The Rural Society says in its report:

> Wheat of unusual weight was presented, demonstrating the great agricultural value of regions heretofore considered sterile and incapable of growing anything. These now present excellent wheat, widening the agricultural area, rectifying past errors of judgment and proving the country to be better than its reputation, giving more than has been promised for it. The great Pampa has been robbed of its cloak of sterility, showing better products than were ever before prophesied from there, notably good wheat and barley. The production of well-developed hard wheat of

good weight in the colony of San Blas,[a] hitherto called the country of rocks, points significantly to the future. So do the facts that superior cereals have been grown in the Territory of Chubut (Pl. I, frontispiece) away to the southwest and around Trenque Lauquen. Chubut, which now produces barley without rival, will in a few years produce the best wheat in the world. This year, however, the award for the best must be given to the Province of Buenos Aires. The best was a sample of Barletta from Las Martinettas, 248 miles southwest of Buenos Aires, on the Southern Railway. It was smooth, clean, dark, dry, compact, and fragrant, and weighed 66.19 pounds to the bushel.[b] Other superior specimens were: From General Villegas, 284 miles west of Buenos Aires, on the Western Railway, wheat giving a weight of 65.72 pounds per bushel, on new land; from Necochea, on the Atlantic coast, 140 miles east of Bahia Blanca, a sample showing 65.76 pounds per bushel, and from Lincoln, 194 miles west of Buenos Aires, on the Western Railway, a sample giving 65.57 pounds to the bushel. From various other places samples weighing 64.48 pounds to the bushel were shown. These results were secured by planting good seed in the right manner. It is all in the work and the seed; the land will pay according to what has been put into it.

The Province of Buenos Aires and Barletta wheat combined scored a notable victory in this competition. The exhibits from the Province of Santa Fe, where Argentine wheat growing originated, were small and of poor quality as a rule. The opinion is expressed by Dr. Abel Bengolea, editor of the Rural Society's Monthly Anales and writer of the report quoted above, that this is partly due to bad farming, and that the province might make a better showing, especially in the southern part. The exhibits from Entre Rios were visibly deficient. Some very good specimens came from the German colonies in southern Cordoba and northern Buenos Aires, and from western Buenos Aires down into the Territory of the Pampa.

Much favorable notice is given to the region around Trenque Lauquen, 275 miles southwest of Buenos Aires, on the Western Railway.[c] Candeal wheat, for macaroni, that hitherto has been considered exceptional at 62.15 pounds per bushel,[d] gave there 63.31 pounds to 64.56 pounds per bushel in a collection of 30 samples. Russian wheat also gave surprising results in that vicinity, exceeding the weight of the best samples shown in the exposition by the Russian Government.

Next to Barletta, the Russian wheat made the best showing and is proving itself well adapted to Argentina. It is much grown in the west and south. The Russian Department of Agriculture has an

[a] In the Bay of San Blas, on the Atlantic coast, about midway between the mouths of the rivers Colorado and Negro, about 100 miles south of Bahia Blanca, in the lower corner of the Province of Buenos Aires. It has no railway and no seaport improvements, though there is a good natural harbor.

[b] Natural weight of wheat is expressed in Argentina by the weight in kilos per hectoliter, as stated on pp. 2 and 89 of this bulletin. All these, however, have been converted into pounds avoirdupois per Winchester, or United States, bushel.

[c] See p. 32, under "Present and prospective area."

[d] This variety has been grown mostly in the Province of Entre Rios, 250 miles east and more than 200 miles north of Trenque Lauquen.

expert in Argentina studying agricultural conditions there, and he exhibited a fine collection of Russian wheats. The heaviest of them, according to the society's report, weighed 64.56 pounds to the bushel, while samples of the same wheat were brought from Trenque Lauquen weighing 65.64 pounds to the bushel. Of 21 samples shown from various parts of the Province of Buenos Aires, only one was 61.18, two 62.15, six 65.25, one 66.42, and the others 63.70 to 65.25 pounds to the bushel. The lowest were from the north and the highest from the south.

Many samples of French wheat were shown, but all were light weight, as is always the case with this variety. Of 48 best specimens shown in the Buenos Aires grain exchange, only one reached a weight of 64.87 pounds per bushel.

## ARGENTINE FARMERS AND FARM CONDITIONS.

### TENURE OF AGRICULTURAL LANDS.

The greatest weakness of Argentina is the lack of progressiveness, intelligence, and business-like methods among the average farmers, together with an absence of a permanent interest in the soil. Only about one farmer in three owns the land he tills,[a] and in this minority of owners are included many assisted colonists, no better prepared for the work they have undertaken than the renters—many of them not so well.

### LARGE PROPORTION OF RENTERS.

The following incomplete statistics, compiled from reports of the Argentine Department of Agriculture, show the number of renters, compared with the number of those owning the land they were farming, for four years ending with 1902 in the four chief agricultural provinces.

[a] In the United States, including Alaska and Hawaii, according to the census of 1900, there were 5,739,657 farmers. Of these 752,920 were cash renters and 1,273,366 were renters on shares, or a total of 2,036,286 renters, only 35.3 per cent of the entire number of farmers of the country.

20923—No. 27—04——2

*Farm tenure in four Provinces in Argentina.*

[Incomplete returns by thrashers.]

| Provinces. | Owned. | | Rented for cash. | | Rented on shares. | | Total farms. |
|---|---|---|---|---|---|---|---|
| | Number. | Per cent. | Number. | Per cent. | Number. | Per cent. | |
| **1898–1899.** | | | | | | | |
| Buenos Aires | 3,291 | 26.52 | 7,689 | 61.55 | 1,481 | 11.93 | 12,4[illegible] |
| Santa Fe | 5,352 | 38.92 | 5,422 | 39.43 | 2,978 | 21.65 | 13,7[illegible] |
| Cordoba | 1,832 | 42.11 | 1,395 | 32.06 | 1,124 | 25.83 | 4,3[illegible] |
| Entre Rios | 2,940 | 60.31 | 1,234 | 25.31 | 701 | 14.38 | 4,87[illegible] |
| Total | 13,415 | 37.91 | 15,690 | 44.33 | 6,284 | 17.76 | 35,39[illegible] |
| **1899–1900.** | | | | | | | |
| Buenos Aires | 4,356 | 38.60 | 5,960 | 52.81 | 969 | 8.59 | 11,28[illegible] |
| Santa Fe | 5,848 | 41.92 | 5,477 | 39.27 | 2,624 | 18.81 | 13,94[illegible] |
| Cordoba | 1,587 | 43.31 | 1,292 | 35.26 | 785 | 21.43 | 3,66[illegible] |
| Entre Rios | 3,222 | 58.53 | 1,561 | 28.36 | 722 | 13.11 | 5,50[illegible] |
| Total | 15,013 | 43.64 | 14,290 | 41.54 | 5,100 | 14.82 | 34,40[illegible] |
| **1900–1901.** | | | | | | | |
| Buenos Aires | 2,474 | 26.66 | 5,573 | 60.06 | 1,232 | 13.28 | 9,27[illegible] |
| Santa Fe | 6,832 | 42.85 | 6,297 | 39.49 | 2,816 | 17.66 | 15,96[illegible] |
| Cordoba | 1,685 | 42.59 | 1,403 | 35.47 | 868 | 21.94 | 3,95[illegible] |
| Entre Rios | 2,824 | 57.78 | 1,442 | 29.51 | 621 | 12.71 | 4,88[illegible] |
| Total | 13,815 | 40.55 | 14,715 | 43.20 | 5,537 | 16.25 | 34,06[illegible] |
| **1901–1902.**[a] | | | | | | | |
| Buenos Aires | 4,388 | 25.33 | 10,336 | 59.67 | 2,599 | 15.00 | 17,32[illegible] |
| Santa Fe | 5,855 | 40.31 | 6,514 | 44.85 | 2,155 | 14.84 | 14,52[illegible] |
| Cordoba | 2,108 | 54.78 | 1,256 | 32.64 | 484 | 12.58 | 3,84[illegible] |
| Entre Rios | 709 | 42.99 | 713 | 43.24 | 227 | 13.77 | 1,64[illegible] |
| Total | 13,060 | 34.97 | 18,819 | 50.39 | 5,465 | 14.64 | 37,34[illegible] |

[a] The report for this year was made early in the season and was partly estimated. Complete returns would probably increase the number.

These statistics, like most other statistics of the wheat area, harvest, yield, etc., in Argentina, came from the thrashing-machine men, and can be accepted as only approximately accurate. They are not complete, but they are sufficiently so to indicate the great majority of renters. It is stated that 10 per cent must be added for wheat thrashed by horses, and therefore not reported by the machine operators. This is too high an estimate, in my judgment, as thrashing with horses has almost entirely disappeared.[a] The farmers not reported are largely renters.

PROPORTION OF LAND FARMED BY OWNERS.

The proportion of land farmed by owners, however, is greater than their numerical strength, because some of the owners have large tracts. The 34,067 farms under cultivation in 1900–1901 in four provinces were divided in area as follows:

| | | | |
|---|---|---|---|
| 124 acres or less | 13,786 | 1,236 to 1,483 acres | 90 |
| 125 to 247 acres | 8,690 | 1,484 to 1,730 acres | 37 |
| 248 to 494 acres | 8,642 | 1,731 to 1,977 acres | 17 |
| 495 to 741 acres | 2,091 | 1,978 to 2,224 acres | 15 |
| 742 to 988 acres | 479 | 2,225 to 2,471 acres | 5 |
| 989 to 1,235 acres | 187 | Over 2,471 acres | 28 |

[a] See p. 67, under head of "Harvesting and thrashing."

The report of the collection of the land tax in the Province of Buenos Aires in 1900 shows that of 39,571 rural proprietors of all kinds owning 75,395,399 acres the division was as follows:

| | | | |
|---|---|---|---|
| 25 to 247 acres | 23,287 | 1,607 to 12,355 acres | 5,638 |
| 248 to 1,606 acres | 9,226 | Over 12,355 acres | 1,420 |

Some of the largest individual holdings were, in acres, as follows:

| | | | |
|---|---|---|---|
| 373,121 | 200,139 | 160,479 | 144,396 |
| 281,331 | 191,313 | 160,120 | |

In the Province of Santa Fe, with 32,299,999 acres, the number of proprietors in 1900 was 61,241. The number of rural and urban owners of less than 62 acres is given as 45,184, and those owning 62 acres and over numbered 16,057. The ownership of farms of 62 acres and over is divided as follows by the Argentine report:[a]

| | | | |
|---|---|---|---|
| 62 to 247 acres | 6,512 | 6,178 to 12,355 acres | 849 |
| 248 to 741 acres | 6,224 | Over 12,355 acres | 472 |
| 742 to 6,177 acres | 2,424 | | |

In the latter class, those owning more than 12,355 acres, is included 20,893,805 acres, or 64 per cent of the province. But these are mostly forest lands in the northern part, unfit for farming. Many large tracts are being, or have been, subdivided for colonization.

### SYSTEM OF RENTING.

Two plans of renting land for agriculture are followed in Argentina. Ninety-five per cent of the small farmers begin under the "medianero" system; that is, on shares, and, as soon as they are able, get into the other and better class of "arrendatarios," or cash renters. The "medianero" generally starts in on $40 to $60 cash capital, and not always that much. He has probably had one year's experience as a farm laborer, and perhaps earned money enough in that season to bring out his family from Italy or other European country. It is usually easy for him to find some land owner who will give him land, a mud hut to live in (called a "rancho"), horses, bullocks, implements, and seed to start farming on his own account. The owner of the land generally guarantees the payment for the purchases of the "medianero," to a limited extent, at the nearest "almacen," or country general store, where he can buy anything he needs. The farmer and his family prepare the land, sow and harvest the wheat, and it is sold by the land owner at his discretion. After taking out the cost of the bags,

[a] These statistics are taken from the "Boletin de Agricultura y Ganaderia," the official semimonthly bulletin published by the Argentine Department of Agriculture, issue of September 15, 1902. It will be noticed that there is a discrepancy between the total number of owners of 62 acres and over and the itemized statement of this class. The sum of the five subdivisions of this class is 16,481, or 424 more than the total just given.

binding twine, and thrashing, as well as the seed, the proceeds are divided between the farmer and the land owner, usually evenly; hence the name "medianero," from the Spanish word "medio," meaning half. Sometimes when the farmer begins and has to ask everything of the land owner, he can not get half the proceeds and has to content himself with 30 to 40 per cent. Later, in some good districts, he may have to furnish part of the horses or other equipment and still get only 50 per cent of the profits. The contract is sometimes modified in other minor respects.

The Italian farmer saves his money, never spending a cent that can possibly be avoided, and in one to three years he is able to rent land for cash and furnish everything himself. He is trusted by the country merchant for practically everything he needs, to be paid for after harvest. If the harvest fails, the merchant must carry the farmer another year or lose the account. Sometimes the farmer, after two bad seasons, gathers his few belongings together and looks for a new location, leaving his debts behind him. This practice costs the farmer dearly, for the merchant aims to make his prices cover the risk. Often the merchant is a buyer of grain and hurries the farmer to market too early and pays him a low price for his produce at weights which the merchant understands better than the farmer. Generally there is competition in buying, however.

### RENTAL VALUE OF LAND.

Rent of agricultural land varies greatly, according to its supposed productive value, its distance from a railway station, and from the seaport. The range of cash rentals, paid generally after the harvest, is estimated by Señor Ronaldo Tidblom as follows:

*Cash rental for land.*

| Province. | United States currency per acre. |
|---|---|
| Buenos Aires | $0.40 to $4.00 |
| Santa Fe | .28 to 4.00 |
| Cordoba | .28 to 2.80 |
| Entre Rios | .28 to 2.80 |

From my own observation, I know that the best wheat land in the Province of Buenos Aires rents for 70 cents to $2 per acre, except that closest to the city of Buenos Aires.

Land is also rented for a share of from 10 to 20 per cent of the net crop. Rental contracts are for from two to five years, generally three years.

### INCREASE IN NUMBER OF SMALL FARMS.

Ownership of land by small farmers is on the increase and there is a strong demand for the best agricultural lands, accessible to market.

As the country grows older and the adaptability of different regions to various purposes is better understood, there is a greater tendency toward "settling down," and farmers are more disposed to invest their savings in land. The settlement of the boundary dispute with Chile and the consequent removal of the danger of war, with a good season just closed and another in prospect, combine to promote the establishment of permanent farms and homes. The Argentine Government is now applying itself, through the Department of Agriculture, to the improvement of conditions in the country that have discouraged settlement there. Mixed farming and rotation of crops is the text upon which the officials and experts of the Department of Agriculture and all the principal agricultural writers in the country, both native and English, are preaching. Farmers are being urged to make better use of the land, to be satisfied with less, and not risk everything in one crop. All these influences, to which is now added the increase in the price of land, tend to improve the grade of farming.

## AVAILABLE PUBLIC LANDS.

Nearly all the best land in Argentina is owned by private parties. The Government has parceled it out in large tracts for various reasons, until now it is only in distant parts, not served by railways, that public lands may be had. Nevertheless settlers are still finding homes on the State domain. In 1903 a new homestead law was passed, and an effort is being made to open up these lands to settlement, to encourage navigation of the rivers in the southern part of the country, and the extension of railways already building in that direction.

About a year ago the available public lands, all in the national territories, were as follows:

| | Acres. | | Acres. |
|---|---|---|---|
| Tierra del Fuego | 4,660,418 | Chaco | 32,172,861 |
| Santa Cruz | 61,626,441 | Formosa | 21,430,165 |
| Chubut | 55,687,983 | Misiones | 1,956,200 |
| Rio Negro | 37,266,051 | | |
| Neuquen | 15,249,923 | Total | 237,768,303 |
| Pampa | 7,718,261 | | |

It is estimated by the Argentine Department of Agriculture that in Tierra del Fuego, Santa Cruz, Chubut, Rio Negro, Neuquen, and the Pampa (Pl. I, frontispiece), about 50,000,000 acres may, and eventually will, be utilized for wheat raising. This is an addition to the present wheat area of the country in the four chief provinces in which wheat is now grown.[a]

[a] The entire wheat area of the United States, according to the census of 1900, was, in 1899, 52,588,574 acres.

The average sale price of national lands, sold at public auction in recent years, has been, in cents gold, per acre:

| | | | |
|---|---|---|---|
| Pampa | 17 | Chubut | 16 |
| Tierra del Fuego | 40 | Santa Cruz | 30 |
| Neuquen | 16 | | |

The lowest prices were for lots of more than 300 acres and the higher prices were for smaller lots. Land most favorably located, near navigable streams or railway stations or of exceptional fertility, sold for higher prices.

PRICES AND CONDITIONS UNDER NEW HOMESTEAD LAW.

The new homestead law authorizes the Division of Lands and Colonies, which is a section of the Department of Agriculture, to dispose of these lands at the rate of not more, in one year, than 1,000 kilometric square leagues (6,177,850 acres), aside from lands reserved for colonies. The size of agricultural lots is 247 acres and of pastoral lots 6,177 acres. Not more than two agricultural lots or one pastoral lot may be granted to one person, as a colonist or as a purchaser. Any amount may be rented. No person or corporation may acquire more than two agricultural lots or one pastoral lot in reserved lands, either directly or by transfer previous to the payment of the full price, or more than 49,400 acres of unreserved lands. The sale price for unreserved lands is not less than 16 cents per acre, to be paid in installments to be completed within five years, at 6 per cent interest. Improvements at the rate of $220 for each 6,177 acres must be made by lessees and purchasers of these lands, and they must be stocked with sheep or cattle. Pastoral lots are sold to colonists under the same terms as to price, stocking, and improvements. Agricultural lots are sold for about 44 cents per acre, payable in six annual installments. Within two years the colonist must build a house and cultivate the land according to specified requirements. Provision is also made for forest land and land on which yerba (*Ilex Paraguayensis*) shrubs or trees grow.

The Government is authorized to make gratuitous grants to first settlers to an amount not exceeding one-fifth of the land available for colonization.

Under the operation of this law 400 kilometric leagues were offered in the Territory of Chubut at about 19 cents per acre, 10 per cent down and the balance in five equal annual installments with interest at 6 per cent. No person was allowed to acquire more than 6,178 acres. Each buyer was required to comply with the following conditions:

1. Be an Argentine citizen, native born, or become naturalized within two years from the date of the sale.
2. Be more than 22 years of age if a male, or have a son 16 years of age if a widow.
3. Settle personally on the land, stock it within the first two years with 400 sheep or 1 cow for every 5 sheep, to build the necessary dwelling, corrals, etc., and plant 100 trees.

4. Timber on the land can not be used for anything but firewood and fences until the conditions in the preceding paragraphs have been complied with, when title is given. The land is held under mortgage until the last payment is made, and can not be transferred prior to that time.

Under these conditions, and with some additional concessions as first settlers, several hundred Boer families settled in the Territory of Chubut during the past year, taking the places of some of the Welsh colonists there, who became dissatisfied and removed to Canada.

Some of the provinces also have land for sale that can be bought at very low prices, including valuable timber lands. The lands referred to in the foregoing are all in the Territories.

PRICES AND SALES OF PRIVATE LANDS.

Prices of land fluctuate consideraby with favorable seasons and are greatly influenced by successful agricultural and pastoral operations, leading to demands for land for special or general purposes in certain sections. For example, a boom in land in the Province of San Luis, 500 miles or more from the city of Buenos Aires, followed the successful growth of alfalfa on land that was supposed to be worth little or nothing.

The following statement, prepared by the Argentine Department of Agriculture in the fall of 1902, probably gives as fair an idea of the value of land as can be had:

*Prices of agricultural lands at private sale in Argentina.*

PROVINCE OF BUENOS AIRES.[a]

| Distance from Buenos Aires. | Price per acre in United States currency. | | | | |
|---|---|---|---|---|---|
| | E. | S. | SW. | W. | NW. |
| 31 to 62 miles | $15.00 to $27.00 | $14.00 to $27.00 | $15.00 to $31.00 | $23.00 to $97.00 | $24.00 to $97.00 |
| 63 to 124 miles | 8.00 to 15.00 | 6.00 to 15.00 | 8.00 to 15.00 | 14.00 to 39.00 | 14.00 to 23.00 |
| 125 to 248 miles | 4.00 to 14.00 | 5.00 to 14.00 | 6.00 to 17.00 | 6.00 to 15.00 | 12.00 to 15.00 |
| Over 248 miles | ..... | 6.00 to 14.00 | 2.00 to 3.00 | 3.00 to 50.00 | ..... |

[a] The bulk of wheat grown in the province is sown at a distance of more than 124 miles from the city of Buenos Aires.

OTHER PROVINCES AND TERRITORIES.

| Province or territory. | E. | SW. | SE. | S. |
|---|---|---|---|---|
| Santa Fe | ..... | $4.00 to $6.00 | $5.00 to $15.00 | $5.00 to $24.00 |
| Entre Rios | ..... | 3.00 to 15.00 | 3.00 to 15.00 | 3.00 to 15.00 |
| Cordoba | ..... | ..... | ..... | 3.00 to 10.00 |
| Pampa | $3.00 to $5.00 | ..... | .50 to 2.00 | .50 to 2.00 |

| Province or territory. | N. | Center. | W. | NE. |
|---|---|---|---|---|
| Santa Fe | $1.00 to $5.00 | $5.00 to $24.00 | $3.00 to $10.00 | ..... |
| Entre Rios | ..... | 5.00 to 12.00 | 3.00 to 15.00 | ..... |
| Pampa | .50 to 2.50 | ..... | ..... | $2.00 to $4.00 |
| Chubut—irrigated valleys | 24.00 to 48.00 | ..... | ..... | ..... |
| Rio Negro—irrigated valleys | 8.00 to 24.00 | ..... | ..... | ..... |

In places these prices are too low and in others too high. The prices for land at a distance of 125 miles to 250 miles from the city of Buenos Aires will average somewhere around $10 to $13 per acre for the best locations. During the years 1902 and 1903 one great Argentine ranch, including many thousands of acres of the best wheat land in the country, well located along the railway south, about 320 miles southwest of the city of Buenos Aires and about 160 miles north of Bahia Blanca, was being sold in small lots for $12 per acre. Other lands were sold at higher prices, but the average above stated may be accepted.

It is customary to calculate rent all the way from 8 to 12 per cent on the valuation of the land. At 70 cents to $2 per acre, therefore, the extremes would be $7 to $20 per acre, taking an average rental of 10 per cent. But as a matter of fact wheat land very seldom rents for $2 an acre or for more than $1 to $1.25, and often for less than 70 cents. Rents for wheat land go as low as 32 cents per acre, and it is exceptional if more than $1 per acre is paid. The average value of cereal land is estimated by competent authorities in Argentina to be about $5 gold per acre.

Many owners of large tracts are holding to their lands and refusing to sell, being satisfied with an income from grazing or colonizing, which, while small per acre, is large in the aggregate. This has greatly interfered with the development of the country. However, as families break up or become pressed for funds with which to maintain luxurious establishments in Buenos Aires and Europe, these lands are being divided. The papers are full of advertisements and reports of land sales, almost always at auction. Much of the public land for colonization or sale is offered at auction to the highest bidder, for in Argentina almost everything is sold at auction.

### COLONIZATION.

The first agricultural colonization in Argentina was in 1825 by the Rio de La Plata Agricultural Association, an English company that sent colonists from Glasgow to San Pedro, in the Province of Entre Rios. The Government has always given more or less encouragement to the establishment of agricultural colonies, and is now making greater efforts than ever to secure them. Liberal terms have always been offered to persons or corporations bringing actual settlers to develop the country by tilling the land. Scores of colonies have been established through various agencies, aside from the individual, independent immigrants. One German company has about 1,000,000 acres, occupied by 29 colonies and 12 towns—about 16,000 persons all told. Three Jewish colonies, founded by the Baron Hirsch Colonization Association, have about 916,000 acres and 10,000 population. There are various Russian, Swiss, German, Austrian, Italian, Spanish, and

even Scandinavian settlements, more or less organized. A very large majority of all the small farmers, however, are Italians. They are largely from the north of Italy, and, though very ignorant, are very industrious. Efforts to improve agricultural conditions in the country always include plans to give these men something to work at when they are not busy with wheat or whatever other one or possibly two crops they may be raising.

### IMMIGRATION.

The balance of immigration in favor of Argentina during 1902 was 16,560, the smallest since 1891, the year following a revolution, and except that year, the smallest since 1875. In 1903 the balance in favor of the country was 35,359. The largest immigration was in 1889, when the balance in favor of the country was 220,260. For a number of years the immigrants have exceeded the emigrants by 40,000 to 50,000 annually, but the number of emigrants has been gradually increasing from 40,000 to 80,000 per annum. The Government maintains agents in Europe and offers to immigrants free transportation from their homes to the land they are to occupy, which is often wholly or partly given to them—not the best land, however. Still, they are not satisfied, and many of them leave the country. Thousands come out for the harvest, stay a few months, or in some cases two or three years, save some money, and return to Europe with it. Some of these return with their families and buy or rent land in Argentina; but it is the fondest desire of the Italian to own a little home in sunny Italy. They have not been offered sufficient inducements in Argentina to overcome this patriotic desire. They grudge every penny spent away from Italy. Going out steerage, they often return in the same clothing they wore when they left home.

A commission appointed by the Government is trying to find out what is wrong to recommend a remedy to Congress. In his message to Congress in May, 1903, President Roca said:

> Immigration has diminished, owing to the crisis and to bad harvests in recent years, and last year the arrivals exceeded the departures by only 13,560[a] persons. However, those who leave are less adapted to the necessities of the country than those who are now arriving, who are mostly agricultural laborers and easily find well remunerated employment, and I am convinced that, when our economic conditions improve, better guarantees of peace and justice are given, suitable regulations are made for labor, and our great natural industries are perfected, the immigratory current will again increase.

The subject is being very generally discussed in Argentina and many causes are assigned. The principal reasons given are the bad administration of justice, the persecution of petty officials, and the imposition of sometimes oppressive taxes in the provinces. A major-

[a] "Annuaire Statistique de la Ville de Buenos Ayres" for 1902 gives the net immigration as 16,653 for the calendar year 1902.

ity of foreigners do not become citizens, though a man may become a citizen after two years' residence in the country, and is exempt from military duty for ten years. Citizenship may also be conferred by executive order upon certain classes of distinguished foreigners engaged in business, or establishing colonies, or rendering some service to the country. The property rights of foreigners are well guarded by the laws when those laws are fairly administered. Foreigners have found it wise to keep out of politics and leave the business of government to the native Argentines, who have not welcomed the foreigner to their politics as we have in the United States. A new electoral law has just been passed, intended to give the people a real voice in the election of public officials. Leading Argentines fully realize the country's need of better farmers, and that conditions must be made such as to invite them to come and to stay. Necessary reforms are coming, not all at once and soon, but gradually. It is proposed now to still further centralize the dealings with colonists, placing them for five years after their arrival wholly under the administration of the National government, leaving them free from the provincial and municipal oppression of which they complain.[a]

*Immigrants arrived and emigrants departed, Argentina, 1895–1902.*

| Nationality. | 1895. | 1896. | 1897. | 1898. | 1899. | 1900. | 1901. | 1902. |
|---|---|---|---|---|---|---|---|---|
| Italy | 41,203 | 75,304 | 44,678 | 39,135 | 53,295 | 52,143 | 58,314 | 32,314 |
| Spain | 11,288 | 18,061 | 18,316 | 18,716 | 19,798 | 20,383 | 18,066 | 13,911 |
| France | 2,448 | 3,400 | 2,835 | 2,449 | 2,473 | 3,160 | 2,788 | 2,378 |
| Austria-Hungary | 549 | 963 | 1,768 | 593 | 950 | 2,024 | 2,742 | 2,135 |
| Russia | 2,336 | 575 | 617 | 1,459 | 1,686 | 2,119 | 2,086 | 1,753 |
| Turkey, including Syria | 336 | 780 | 1,189 | 1,533 | 2,715 | 1,583 | 2,159 | 1,671 |
| Germany | 1,067 | 1,015 | 987 | 779 | 732 | 760 | 836 | 1,029 |
| United Kingdom | 329 | 429 | 562 | 632 | 477 | 421 | 439 | 405 |
| Roumania | 6 | 20 | 100 | 33 | 33 | 106 | 471 | 283 |
| Switzerland | 465 | 679 | 390 | 261 | 343 | 355 | 363 | 267 |
| Denmark | 118 | 126 | 111 | 76 | 67 | 121 | 175 | 187 |
| United States and Canada | 46 | 82 | 94 | 80 | 127 | 89 | 151 | 132 |
| Greece | 10 | 1 | 67 | 62 | 39 | 32 | 58 | 91 |
| Montenegro | ..... | ..... | 1 | 9 | 1 | ..... | 17 | 27 |
| Sweden | 72 | 52 | 42 | 16 | 24 | 10 | 18 | 21 |
| Servia | ..... | ..... | ..... | 3 | 40 | 42 | 4 | 4 |
| Bulgaria | ..... | ..... | ..... | ..... | ..... | 2 | ..... | ..... |
| Other countries | 953 | 1,196 | 1,221 | 1,294 | 1,642 | 1,501 | 1,440 | 1,384 |
| Total by sea | 61,226 | 102,673 | 72,978 | 67,130 | 84,442 | 84,851 | 90,127 | 57,992 |
| Through Montevideo | 19,762 | 32,532 | 32,165 | 28,060 | 26,641 | 21,051 | 35,824 | 38,088 |
| Total immigrants | 80,988 | 135,205 | 105,143 | 95,190 | 111,083 | 105,902 | 125,951 | 96,080 |
| Total emigrants | 36,820 | 45,911 | 57,457 | 53,536 | 62,241 | 55,417 | 80,251 | 79,427 |
| Net immigration | 44,168 | 89,294 | 47,686 | 41,654 | 48,842 | 50,485 | 45,700 | 16,653 |

[a] In further elucidation of this essential factor in the problem of largely increased wheat production in Argentina the following tables of immigration statistics, derived from Argentine official sources, are appended. However extensive and productive the wheat lands may be, and however ready railroad capital may be to push into new wheat regions, there can be no increase of production on a large scale without an adequate supply of suitable labor, and this, as the author states, must come from immigration.—*J. H.*

*Gross immigration, Argentina, total for forty-three years, 1857–1899.*

| Nationality. | Immigrants. | Nationality. | Immigrants. |
|---|---|---|---|
| Italy | 1,093,112 | Portugal | 8,166 |
| Spain | 320,898 | Denmark | 2,260 |
| France | 157,008 | United States and Canada | 1,761 |
| United Kingdom | 33,133 | Sweden | 1,030 |
| Austria-Hungary | 28,724 | Other countries | 32,586 |
| Switzerland | 24,175 | | |
| Germany | 26,342 | Total by sea | 1,765,784 |
| Belgium | 18,826 | Through Montevideo | 687,524 |
| Russia | 17,816 | | |
| Netherlands | 4,962 | Total | 2,453,308 |

*Number of persons of foreign birth living in Argentina.*

| Nationalities. | 1895. | 1899. | Nationalities. | 1895. | 1899. |
|---|---|---|---|---|---|
| | *Census.* | *Computed.* | | *Census.* | *Computed.* |
| Italy | 492,636 | 600,000 | Austria-Hungary | 12,803 | 15,400 |
| Spain | 198,685 | 238,900 | Bolivia | 7,361 | 8,800 |
| France | 94,098 | 112,900 | Belgium | 5,446 | 6,500 |
| Turkey, including Syria | 48,650 | 58,400 | Netherlands | 2,880 | 3,500 |
| Brazil | 24,725 | 14,700 | Portugal | 2,269 | 2,900 |
| United Kingdom | 21,788 | 26,100 | Sweden | 1,668 | 2,000 |
| Chile | 20,594 | 24,700 | Denmark | 1,417 | 1,700 |
| Germany | 17,143 | 20,600 | United States and Canada | 1,381 | 1,700 |
| Russia | 15,047 | 18,100 | Other countries | 6,585 | 8,000 |
| Switzerland | 14,789 | 17,700 | | | |
| Paraguay | 14,562 | 17,500 | Total | 1,004,527 | 1,200,000 |

*Number and percentage of rural landed proprietors in Argentina, 1895, by nationalities.*

| Nationalities. | Total population. | Rural landed proprietors. | Percentage. [a] |
|---|---|---|---|
| Argentina | 2,950,384 | 290,953 | 9.9 |
| Italy | 492,636 | 62,975 | 12.8 |
| Spain | 198,685 | 17,687 | 8.9 |
| France | 94,098 | 11,502 | 12.2 |
| Turkey, including Syria | 48,650 | 4,022 | 8.3 |
| Switzerland | 14,789 | 3,398 | 23.0 |
| United Kingdom | 21,788 | 2,825 | 13.0 |
| Germany | 17,143 | 2,526 | 14.7 |
| Brazil | 24,725 | 2,045 | 8.3 |
| Chile | 20,594 | 2,021 | 9.8 |
| Russia | 15,047 | 2,016 | 13.4 |
| Austria-Hungary | 12,803 | 1,954 | 15.3 |
| Paraguay | 14,562 | 1,160 | 8.0 |
| Bolivia | 7,361 | 699 | 9.5 |
| Belgium | 5,446 | 357 | 6.6 |
| Portugal | 2,269 | 290 | 12.8 |
| United States and Canada | 1,381 | 168 | 12.2 |
| Denmark | 1,417 | 161 | 11.4 |
| Netherlands | 2,880 | 121 | 4.2 |
| Sweden | 1,668 | 96 | 5.8 |
| Peru | 566 | 65 | 11.5 |
| Greece | 313 | 39 | 12.5 |
| Other countries | 5,706 | 423 | 7.4 |
| Total | 3,954,911 | 407,503 | 10.3 |

[a] In this table families are practically regarded as percentages of individuals. The logical percentages are much larger, but how much larger depends upon the number of individuals in the families of the various nationalities.

LAND GREED.

A very common fault of the average farmer is that he wants too much land, and, if permitted to do so, will undertake to cultivate much more than he can care for properly. To be sure, an Argentine farmer can

raise more wheat than a North Dakota farmer, because he can plow and work his land in any month of the year. The average small farmer has 247 acres, but often more, with only his family to help him, except at harvest time. If he can get 400 or 500 acres, the Italian farmer will cheerfully undertake to "work" it alone. Of course, he merely scratches the ground a little and leaves the rest to Providence. Efforts are being made to induce these men to take less land and work it better; but their custom is to save all they can, either to carry out of the country or to buy more land. They dislike to spend money for help or better machinery if they can possibly get the crop planted in any fashion without such expenditures. They do not understand the wisdom of spending a dollar to save five. Their only object is to get as much money as they can, and keep it. In the colonies a man is given from 125 to 247 acres, according to the size and capacity of his family to help work it.

### LIVING CONDITIONS ON AVERAGE FARMS.

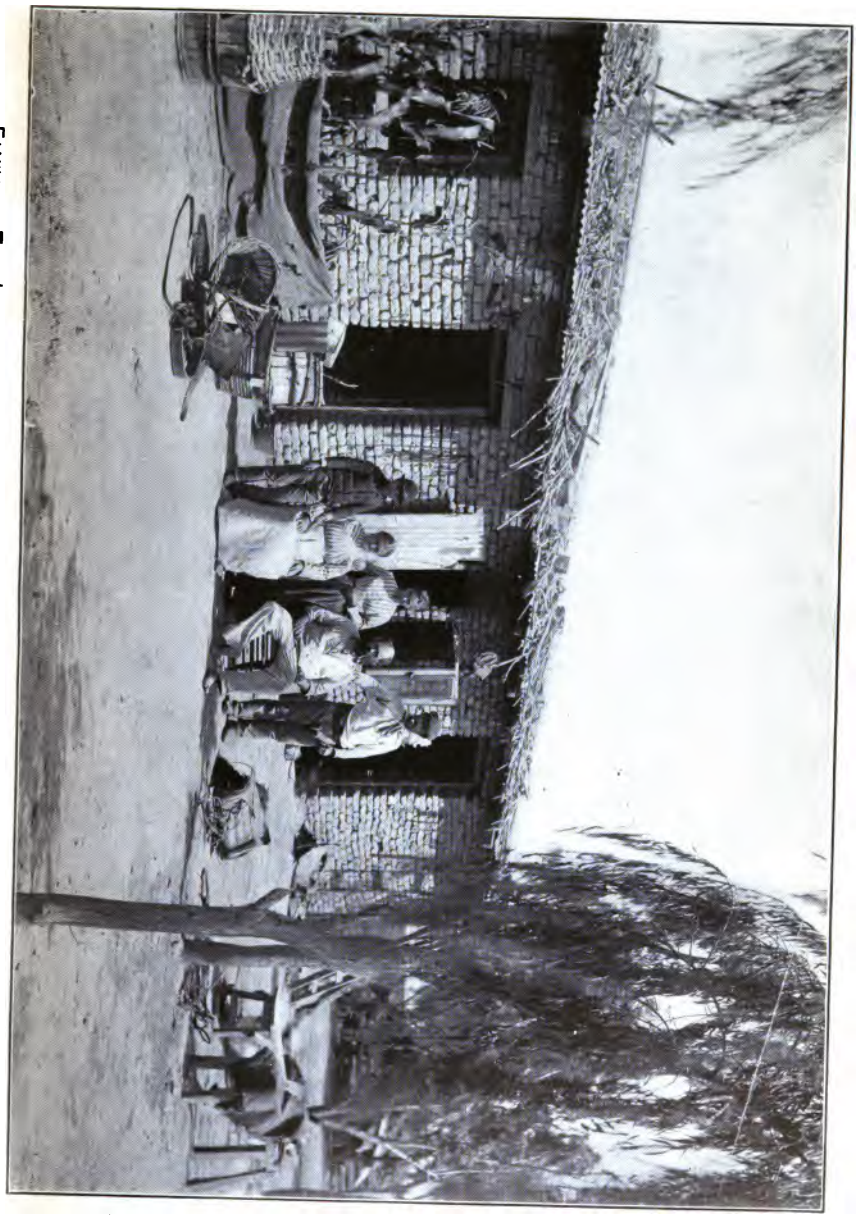
The life of the Argentine wheat farmer is not a condition that would be endured by the North American in the same business. In the opinion of many observers the profits of the Argentine farmer represent merely the privations and the low order of living which he endures. This may be true at present. Roughly speaking, we may say that the rich gifts of soil and climate are often wasted by the Argentine farmer in slovenly methods, stupidly persisting in the same mistakes year after year. Where this is true, his only hope for profit is in depriving himself and his family of everything but the coarsest animal necessities. And the Italian and Russian colonists' ideas of necessities are far below the lowest grade of farm life in the United States. No North American farmer could go to Argentina and endure the life of these people.

### HOUSES, FOOD, AND SOCIAL RELATIONS.

They generally live in miserable mud huts called "ranchos" (Pl. II), scarcely ever more than two rooms, and oftener only one, with a dirt floor. They are content if they have their "yerba maté"[a] in the morning and "puchero"[b] and hard bread (perhaps occasionally having

[a] "Yerba maté" is sometimes called Paraguayan tea. It is a beverage used in the place of tea or coffee, made from the leaves of a tree (*Ilex paraguayensis*) that grows in the Argentine Province of Misiones, in Paraguay, and in southern Brazil. It is extensively used in all South America, especially in the countries below the Equator. The original way of taking it is through a metal tube, having a bulb full of tiny holes which is immersed in the leaves, which are ground to a powder and put in a small gourd. Boiling water is poured over and the bitter compound sucked through the tube. It is a very nourishing drink, and is not a nerve stimulant. It is prepared and used by many people just as we use tea, only it is never taken at meal time.

[b] "Puchero" is simply meat boiled with potatoes and other vegetables and is the poor man's principal dish in Argentina, both in the country and in the cities.



FAMILY OF TWO ITALIAN COLONISTS WITH "RANCHO" OF SUN-DRIED BRICKS, PROVINCE OF SANTA FE.

a cheap undesirable wine with it) twice a day. They seldom have a garden to supply themselves with fresh vegetables, though they do raise potatoes and sometimes a few vegetables for their own use. They buy little besides the yerba, a little sugar and poor coffee, a few coarse vegetables for the puchero, flour, and the cheapest clothing. These people are extremely careless of cleanliness in their habits and are without ambition beyond the accumulation of money to return to Europe or to buy land in Argentina. Sometimes, it is true, when a farmer prospers, he builds a better house and lives better. (Pl. III, fig. 1.) The Russian shows prosperity in this way sooner than the Italian; for the Russian intends to stay.

Most of these people have come from conditions far less favorable than those they encounter in the free air of the Argentine Republic. In Argentina they easily obtain the actual ownership of land, a thing of which they have probably never dared to dream, and to realize it they are willing to submit to many hardships. They are spared the pangs of hunger, to which they have been accustomed, besides much other suffering. Their previous training has been such that they do not complain if they have enough left to live in their poor way and lay by a little. "He may not like it," observes Mr. William Goodwin, in his reference to the troubles of the Italian colonist, "but he likes making money too well to risk his time and his life in trying to improve the government." They learn but slowly to understand what a republic means.

### SCHOOLS AND SCHOOL ATTENDANCE.

The Government provides schools for the children, the latter being very numerous, but usually the attendance is for a few weeks only, and generally pupils are all under 12 years of age because the older ones are needed to work. In some of the colonies, notably the Russian and the Hirsch colonies, schools are maintained by the colony or the church, and the children get more education. There is little demand for education or for any kind or degree of refinement among the Italian farmers, who form the great majority of all. These things are coming slowly. The rule of life among them is to live on as little as possible, to have no comforts, and to hold fast to every "centavo" (Argentine cent), once they get it into their possession.

### HABITS OF REST AND LABOR.

During the growing season, after the wheat is planted and before it is ready to cut, most of these men do little or no work. They merely lie around and sleep or drink and fight among themselves, waiting for the time when they must go to work again. During the busy seasons of plowing, sowing, and harvesting, they labor during all the hours of daylight, and often in moonlight, but they are too ignorant to plan,

to study natural laws, to know why the crops do well or why they do not, or to make the best use of their time or their land all through the year and through a series of years. The efforts of a progressive Minister of Agriculture are now directed toward teaching these people better things, especially in an effort to lead them into mixed farming. The evolution from this population to a modern, progressive farming class, studying the published results of the latest experiments, will necessarily be slow, for it can not be brought about by printed matter. It must be done by example.

### A FACTOR IN COST OF PRODUCTION.

These, then, are our competitors. They are learning where and how to raise wheat, corn, and linseed faster than they are acquiring a desire to live better and more expensively. So the probability is that they will go on producing an increasing quantity and an improving quality of wheat at less cost than most of their competitors.[a]

### CONDITIONS ON LARGE FARMS.

Three-fourths of the wheat raised in Argentina is grown by people of the class who depend on family labor.[b] The other 25 per cent is grown on large farms, where the work is usually done by contract and where hired help is more generally employed. Quite a number of these places are owned and managed by Englishmen, and occasionally Americans, who are doing excellent work. It costs them more to cultivate an acre of wheat, but in good seasons their profits are much greater than those of the Italians, because they get a heavier yield of a better quality of wheat and take better care of it from the time it ripens until it is sold. They are having a decided influence in the improvement of agricultural methods in the country.

Some native estancieros, always hitherto engaged exclusively in stock raising and rather looking down upon agriculture, have gone into cereals to some extent, as they see the handsome profits made by their neighbors while getting their land into alfalfa.[c]

Life on these large estancias, or ranches, which usually combine stock raising with agriculture, is interesting and comfortable. Most of them bear evidences of prosperity. They have large, comfortable houses, and the people live well, with many comforts, pleasures, and refinements. In transferring their active operations from one large field to another their tenants often use well-constructed movable houses. (Pl. III, fig. 3.)

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[a] Such labor would not be regarded as the most economical in the United States.—J. H.

[b] In 1900–1901 6,792,031 acres of wheat were harvested, and of this 5,239,412 acres, or 77 per cent, were grown by family labor.

[c] See statement of Señor Tidblom, p. 42.

FIG. 1.—PROSPEROUS COLONIST'S HOUSE, JEWISH COLONY, PROVINCE OF SANTA FE.

FIG. 2.—COLONIST'S BAKE OVEN, PROVINCE OF SANTA FE.

FIG. 3.—MOVABLE HOUSE, SEEDING TIME, PROVINCE OF SANTA FE.

### CLASS DISTINCTIONS.

Prosperous and capable small farmers may rise to be owners of several thousand acres and employ many men. These work very hard themselves and compel their men to do the same. Often they bring relatives or friends from Europe and give them a start in the new country. The first year of these immigrants is filled with incessant toil at small wages until they have discharged the debt to their master, the man who advanced the money to bring them to the new country. The farmer who has developed in this way gets more out of his men and makes a greater profit than the rich estanciero, unless he has taken on more land than he can manage and is unable to get help at the critical time.

Sharp lines are drawn in Argentina between the rich and the poor, even among farmers. There is no such democracy as in the United States. The poor man understands this perfectly well and keeps his place. The "peon" or farm hand usually approaches the "patron" or owner with his cap in hand and is most deferential. He does not respect the employer, the man of position, who does not exact it. Farm laborers are not given the comfortable quarters that are allotted to them in this country, but they are well fed, such as "camp" fare is, and are satisfied. They get their "yerba maté" in the morning and in the middle of the afternoon and two meals a day, with puchero, bread, generally vegetables, some sort of drink, and sometimes roasted meat.

Argentina is not the place for a North American farmer to go to alone with small capital. He would probably be very unhappy and might not be successful, because he could not readily adjust himself to the life and ways of doing business. Farmers with large capital, proceeding cautiously, or a colony of those with small capital, combined, would succeed if they were rightly directed and did not hurry too much in getting started. Settlers from the North, experienced farmers who would be examples to those about them, will be eagerly welcomed and substantial encouragement will be given them. Property and land holding rights of foreigners are equal to those of native-born citizens.

## PRESENT AND PROSPECTIVE WHEAT AREA.

The wheat area of Argentina can not be mapped out with any degree of certainty. It will require years of experimentation and double the population to establish definitely where wheat can be grown with reasonable certainty of success and to develop the cultivation of cereals in all the available territory of the country. Wheat growing began in the north and extended in that direction much farther than it should. The building of railways helped to promote it, in spite of

high rates, and it is with the greatest reluctance that farmers are abandoning the effort to grow wheat in these warm regions, with their liability to drought and to blighting heat. We know beyond doubt that there is a vast undeveloped wheat area in the southern and southwestern parts of the country; that wheat growing is moving in that direction, and that with increased population and the building of new railways the total production of the country ought to be more than doubled in a few years. Beyond this, the future is uncertain, but far greater increase in production may be expected.

### GROWTH OF TOTAL CULTIVATED AREA.

The following estimate showing the increase in the cultivated area of Argentina is taken from an Argentine official publication[a] and reduced to acres:

*Increase of cultivated area in Argentina.*

| Crops. | Acres sown. | | |
|---|---|---|---|
| | 1890–1891. | 1901–1902. | 1902–1903. |
| Wheat | 2,965,200 | 8,144,416 | 9,066,346 |
| Linseed | 93,898 | 1,934,798 | 3,221,443 |
| Maize | 2,088,081 | 3,471,755 | 3,706,500 |
| Other grains | 110,701 | 247,100 | 247,100 |
| Alfalfa | 1,532,020 | 3,088,750 | 3,261,720 |
| Peanuts | 29,652 | 59,551 | 59,551 |
| Sugar cane | 62,763 | 113,666 | 113,666 |
| Vineyards | 72,153 | 109,465 | 109,712 |
| Tobacco | 12,849 | 31,357 | 31,382 |
| Other crops | 469,490 | 938,980 | 963,690 |
| Total | 7,386,807 | 18,139,833 | 20,781,110 |

Obviously some of these numbers are merely guessed at and must be taken only as an approximation. But they show the development of agriculture in Argentina during the past ten years.

### WHEAT AREA AND YIELD.

The wheat area, by Provinces (Pl. I, frontispiece) with the average yield per acre in the Provinces and in the entire country, for the past five years, is given herewith. These statistics were compiled from thrashing-machine returns published by the Argentine Department of Agriculture, and while not complete, are approximately correct.

[a] From Noticia Breve sobre la Republica Argentina como País de Inmigración, published by the Argentine Department of Agriculture, March, 1903. These statistics do not quite agree with others published by the same department, being larger. These are evidently the areas sown, or estimated to have been sown, while the other statistics given in this chapter represent the areas harvested.

*Acreage and yield of wheat.*

| Provinces. | 1898–1899. | | | 1899–1900. | | |
|---|---|---|---|---|---|---|
| | Acres. | Bushels. | Bushels per acre. | Acres. | Bushels. | Bushels per acre. |
| Buenos Aires | 1,929,886 | 34,339,254 | 17.79 | 2,046,235 | 33,661,449 | 16.45 |
| Santa Fe | 3,582,340 | 41,272,170 | 11.52 | 3,691,135 | 41,923,519 | 11.36 |
| Cordoba | 1,410,592 | 18,860,169 | 13.37 | 1,381,519 | 15,880,873 | 11.50 |
| Entre Rios | 583,341 | 10,519,910 | 18.03 | 707,467 | 7,983,261 | 11.28 |
| Total | 7,506,159 | 104,991,503 | 13.99 | 7,826,356 | 99,449,102 | 12.71 |
| Other provinces (estimated) | ..... | 2,572,033 | ..... | ..... | 2,204,600 | ..... |

| Provinces. | 1900–1901. | | | 1901–1902. | | | 1902–1903 (estimated). | | |
|---|---|---|---|---|---|---|---|---|---|
| | Acres. | Bushels. | Bushels per acre. | Acres. | Bushels. | Bushels per acre. | Acres. | Bushels. | Bushels per acre. |
| Buenos Aires | 1,960,405 | 27,996,289 | 14.28 | 2,374,290 | 35,680,238 | 15.03 | 3,250,430 | 53,642,217 | 16.50 |
| Santa Fe | 3,037,425 | 25,738,889 | 8.47 | 2,596,149 | 12,850,687 | 4.95 | 3,107,599 | 30,958,316 | 9.96 |
| Cordoba | 1,257,101 | 15,345,486 | 12.21 | 645,141 | 2,349,736 | 3.64 | 1,893,680 | 26,027,177 | 13.74 |
| Entre Rios | 538,100 | 3,099,300 | 5.76 | 428,983 | 2,926,460 | 6.82 | 641,669 | 3,354,519 | 5.23 |
| Total | 6,793,031 | 72,179,964 | 10.63 | 6,044,563 | 53,807,121 | 8.90 | 8,893,378 | 113,982,229 | 12.82 |
| Other provinces (estimated) | ..... | 2,572,033 | ..... | ..... | 2,572,033 | ..... | ..... | ..... | ..... |

## LIMITS OF THE WHEAT AREA.

### CHANGES AND PRESENT BOUNDARIES.

The northern boundary of successful wheat growing in Argentina is not over 75 miles north of the line of the Central Argentine Railway from Rosario to Cordoba, though in 1901–1902 more than 2,000,000 acres were reported north of this line of railway in the Province of Santa Fe alone. The small yield of wheat in all that region in recent years has proved that the land is better adapted to alfalfa and maize than wheat. All the best wheat land of Santa Fe is south of this railway, as shown by crop statistics and by actual inspection by the writer. The wheat in the northern part of Santa Fe does not often pay the farmer for his work. The Italian farmers there, as well as some others, are slow to move, but once they start they go in large numbers. Reports of the seeding in July, 1903, say that the wheat sown amounted to only about 60 per cent of 1902 in that territory, but that the acreage of linseed was increased 20 per cent. Cereal farmers are rapidly moving out of the Province of Santa Fe, particularly the northern part, and going south. From the one colony of Esperanza, in central Santa Fe, half of the 12,000 population left in 1903 to go to the southwest corner of Cordoba to raise wheat and alfalfa.[a] Land there has gone up in value with the influx of population and success in agriculture, until raw land nearly 400 miles almost due west from Buenos Aires is selling for $5 an acre, and $4.61 per acre was refused for a tract of 13,344 acres. This may be considered at present about the

[a] Buenos Aires Standard, September 6, 1903.

western limit of wheat growing. Northwest the wheat area goes well up into southern Cordoba, almost to lat. 32 S., though as it goes north of lat. 31 S. it falls off noticeably.

Reports from the Province of Tucuman, all of which lies north of lat. 28 S., say that in 1903 more than 2,000,000 acres of wheat were sown there, mostly in an effort to make use of abandoned sugar plantations. One test, where a bushel and a half of seed was sown to the acre, gave a yield of 36.3 bushels per acre. This estimate of acreage is doubtless greatly exaggerated. In exceptional years a fair crop may, perhaps, be had there on new land, but the Province will never become a regular wheat producer. It is 718 miles by rail from Buenos Aires, 339 miles from the city of Cordoba, and 584 miles from Rosario, the nearest export market.

To the southwest the line is very indistinct, as it is being constantly moved farther into the Territories of the Pampa, Rio Negro, Neuquen, and Chubut. The entire Province of Buenos Aires is suitable for wheat, except, perhaps, some of the eastern part, which is subject to floods and is under consideration for a vast drainage scheme. But wheat is rapidly following up every line of railway to the south and southwest. The Buenos Aires Western Railway runs to Toay, a short distance into the Pampa, 382 miles by rail southwest of the city of Buenos Aires. From this point the Bahia Blanca and Northwestern runs southwest 232 miles to Bahia Blanca, the best and only improved seaport in Argentina. A few years ago no one dreamed of raising wheat in this region, but the showing it made in the agricultural exposition last May was astonishing. Some of the best wheat came from far out on this line, even from the Pampa itself. A report[a] from Trenque Lauquen, 275 miles on this railway from Buenos Aires, says that in that vicinity 3,678,000 bushels of wheat were harvested in 1903, and that 444,000 acres have been sown to wheat for the harvest of 1903–1904 which, with favorable weather, will give a greater yield than in 1902–1903. Other crops harvested there in 1903 were:

| | | | | | |
|---|---|---|---|---|---|
| Linseed | bushels | 59,052 | Maize | bushels | 393,679 |
| Oats | do | 96,451 | Alfalfa seed | pounds | 110,230 |
| Barley | do | 82,762 | Turnip seed | do | 308,644 |

DISTANCE FROM THE RAILWAY STATION.

In estimating the capacity of a wheat region it is important to know how far from railway stations farming may be successfully carried on. The roads in Argentina are usually bad in the crop-moving season, but thousands of farmers there are hauling wheat 20 to 35 miles, and occasionally farther, to market. Estimates of the practical distance vary from 15 to 30 miles for a small farmer raising cereals only. The estancia which combines stock raising with agriculture, and has its

[a] La Nacion, Buenos Aires, August 16, 1903.

own horses and wagons, can afford to haul farther. The farmer whose grain does not have far to go to the seaport from his railway station can, of course, stand a longer haul from the farm to the station than he whose grain must bear a heavy burden of freight charges after he has delivered it in the local market. The average distance from the station is said to be about 6.25 miles, but this estimate[a] is probably too low at present.

### SEÑOR TIDBLOM'S PREDICTION.

Señor Tidblom recently made the following prediction:

The wheat area will undoubtedly extend toward the south, disappearing from the north and center of Cordoba, Santa Fe, and Entre Rios, and definitely settling in the extreme south of those provinces; in all the Province of Buenos Aires, especially in the north, west, south, and southwest; in all the Territory of the Pampa; in the extreme south of the Province of San Luis, and in the Territories of Neuquen, Chubut, Rio Negro, Santa Cruz, and Tierra del Fuego. It is absolutely impossible to predict its growth, but there are more than 80,000,000 acres in the Republic that could be immediately devoted to successful wheat farming if we had the farmers to do it.

### MR. GOODWIN'S ESTIMATE.

Mr. William Goodwin, F. R. G. S., in his account of wheat growing in Argentina, published in Liverpool in 1895, said:

If one-half of the supposed suitable land were to produce a crop of 10 bushels (imperial) of wheat per acre, the result would be 150,000,000 quarters (1,237,815,000 Winchester, or United States, bushels) which is about half of the estimated wheat crop of the world in 1894; so the Argentine Republic may well be called a country of great possibilities, and meanwhile it is to be noted as showing most unexampled development of trade, that in 14 years an import of 800,000 quarters (6,601,680 Winchester bushels) has been changed to an export of 7,400,000 quarters (61,065,540 bushels) in 1894. There is no such record in any other important country. The Argentine Republic has suddenly taken the third place as an exporter of wheat, and may take the second place in the list if favored by a good crop any year when either Russia or the United States has a bad season.

At the time Mr. Goodwin was writing, but little attention was given to wheat raising in the Province of Buenos Aires; it was nearly all in Santa Fe and Entre Rios, and the great southwest, the hope of agricultural Argentina, had not been exploited. Now there is a much wider prospect, though a great part of the area then considered good wheat land has been given over to other purposes. During this transitory or experimental period, during which it has been demonstrated that the northern part of the country, the Province of Santa Fe, is not suitable for wheat, the gains in total annual production have not been as steady as they will be now that wheat raising has found its most favored locality, and is progressing in that direction.

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[a] Argentine Department of Agriculture, June, 1902.

### THE FUTURE.

Finally, it is quite impossible to estimate closely the present or future wheat area of Argentina. We must wait several years to do that. All we can safely say now is that the acreage of the crop of 1903–1904 will probably be 10,000,000 acres or more;[a] that it is rapidly increasing and getting into a region of very great extent and of an adaptability superior to that of the region in which it was started; that the growing of wheat will increase in proportion to the population and the extension of railways and river navigation. If we see settlers—farmers—going to Argentina in large numbers and staying there; if the Government offers sufficient inducements to get the right sort of men to come and to stay; then we may look for a tremendous production of wheat. The railway service will be provided as fast as there is a demand for it. The Southern Railway, which dominates the Province of Buenos Aires and all the southern part of the country, is enterprising, has practically unlimited resources, and will extend its lines to secure new territory years before it will pay any dividends. It has repeatedly done

[a] The Review of the River Plate, Buenos Aires, September 19, 1903, gives the following estimate of the wheat and linseed acreage, as furnished by the railway companies for their respective territories, in acres:

| | |
|---|---|
| Southern | 2,959,774 |
| Pacific | 1,158,009 |
| Buenos Aires and Rosario | 2,887,077 |
| Central Argentine | 3,516,003 |
| Western | 1,976,800 |
| Entre Rios | 864,415 |
| French, of Santa Fe | 1,704,990 |
| Total | 15,067,068 |
| Wheat | 11,744,527 |
| Linseed | 3,322,541 |

This estimate is probably very near the truth, representing the area sown. The Southern, Pacific, and Western lines all show large gains, especially in wheat. In some of the newer sections of the Southern Railway territory there is an increase of 25 per cent over the previous year, and this has been the case with that company's wheat regions whenever a new line was opened, and even without new lines. Wheat increased 50 per cent and linseed 100 per cent on the lines of the Pacific. On this line wheat raising extended in 1903 as far west as Paunero, 400 miles west of the city of Buenos Aires and a little north, in the extreme western edge of the lower corner of the Province of Cordoba. This marks a new western limit, and this year's success will be sure to encourage ventures farther west next year. On the Central Argentine, which reaches up into the northern part of the country, there has been a decrease in the wheat acreage and a very large increase in that of linseed. The same is true of the Rosario line, which goes in the same direction, but farther north, and hence will show a greater decrease in wheat. Many colonists on that line, formerly wheat growers, have gone in exclusively for linseed. Alfalfa, maize, and cattle raising is claiming the attention of others in that region.

The census of 1900 gives the number of acres of wheat in the United States in 1899 as 52,588,574.

this. The same may be said of the Western and Pacific railways, which are developing the country to the west, only not to the same extent. Most of the Argentine railways are owned by the same group of English capitalists, and they work quite harmoniously together. Competition has been further restricted by the recent consolidation of two of the principal lines to the northwest, the Central Argentine and the Buenos Aires and Rosario.

## THE LAND AND ITS TREATMENT.

### CHARACTER OF THE SOIL.

Argentine farmers have received many rich gifts from nature, of which the fertile soil is one of the most important. The following description was furnished by the Argentine Department of Agriculture:

Three-fourths of the arable land, 263,195,000 acres, is formed of vast plains, crossed by low hills, of alluvial deposits of recent volcanic and granitic origin, composed of fine, light, often loose and seldom stiff, silicious soils, free from stones, generally permeable, as are also their subsoils, of a depth varying from 10 to 50 inches, which nearly always contain a considerable portion of vegetable earth. They are therefore in the highest degree excellent for agriculture and for growing the best species of forage plants.

The land in the east, north, center, and west and part of the south of the Province of Buenos Aires and the southern part of Cordoba and Santa Fe has a light, pumiceous soil, often forming downs which allow an easy drainage and may be considered the very best in the world. In the southeastern and southern parts of the Province of Buenos Aires the soil becomes lighter and more sandy. Toward the west stretch the extensive plains of the Pampa, formed of a light, sandy, humiferous soil, which becomes more fertile in Mendoza and San Juan, where it is very deep, often mixed with pebbles, and rests on a subsoil formed exclusively of shingle, which favors the natural drainage and thus facilitates irrigation. The province of San Luis is similarly formed, but in general the soil is not so deep and is less humiferous than in the Pampa. The soil of the south of Santa Fe and of the center of Cordoba is sandy, somewhat dry, and wooded. In Entre Rios the soil is sandy, somewhat clayey, often light and rich.

In the Territories of Rio Negro, Neuquen, Chubut, Santa Cruz, and Tierra del Fuego the soil has the same physical features as in the Pampa and is generally light and sandy, with the exception of the bottom of the valleys, where clayey, humiferous soil of great richness is always found.

This description applies only to the regions where wheat is or may be grown. In the mountain valleys in the northern Provinces of Cordoba, Tucuman, Salta, Jujuy, and Catamarca is to be found a black vegetable soil of marvelous fertility, often reaching a depth of 4 feet. The same is true in the Territory of Misiones and all along the Parana River in the Provinces of Corrientes and Entre Rios. Most of the northern part of Argentina in the subtropical region is very rich and but little exploited. The soil is lighter than the mountain valleys and is more clayey. But of course no wheat is or will be grown in these hot regions.

### NEED OF IMPROVED METHODS OF CULTIVATION.

If this agricultural land were farmed as it deserves, the world would be astonished at the results, for its fertility is little appreciated. It can best be realized, however, by knowing how it responds to bad treatment. Not half the farmers now raising wheat have any intelligent idea of how it should be done. Many of them came, and still come, to the country in complete ignorance of the most rudimentary principles of agriculture, having been peddlers, laborers, cobblers, or what not in Italy, Spain, or Russia. All are inclined to look upon whatever happens to them as their luck, not due to any disobedience of nature's laws committed by themselves. They do not always profit by experience, but put their hands repeatedly into the same fire. They do not, and most of them can not, read; and so no amount of agricultural literature helps them, except as it may teach an occasional one to be an example to the others. The success of a neighbor is the only thing they heed. Often they will rush madly and without reasoning to follow the footsteps of a neighbor who has done well; but the neighbor is not always there to teach, and even then they will often declare his success to be only luck. They do not observe, for instance, that in a wheat field where the Government telegraph line had set posts along the edge the wheat was more than twice as good close to the telegraph pole, where the earth had beeen deeply stirred. Of course there are many notable exceptions to this general condition of the purely agricultural classes. Many farms are intelligently, and hence very profitably, worked.

### HINDRANCES TO IMPROVEMENT, AND PROBABLE FUTURE.

The condition of agriculture in Argentina is partly due to the fact that stock raising has cast it into such a deep shadow that it could not thrive. Tilling the soil has been rather looked down upon by the cattle kings, who own the greater part of the good land in the country. It is only within fifteen or twenty years that crop growing has commanded general attention in Argentina. Owners of thousands, tens of thousands, even hundreds of thousands of acres of land did not want it broken up—did not want to bother with growing grain. They would neither sell nor rent, and until recent years there was not much demand for land for such a purpose. Its value was unknown. Now, through the efforts of the Government, of enterprising colonizers, and the necessities of some landowners, farming other than stock raising is becoming more general and greater respect is being shown the farmer who raises a crop, even if it is only a small one. The number of farmers has not greatly increased during the past five years, owing to many causes, about which opinions differ. The high taxes and annoyances of petty officials in the country is given as the cause

by the English and other foreigners. Argentines say it is because the English railways have overcharged the farmers' produce; that some bad seasons have been experienced; that farmers have abused the soil and have not deserved success; and that the financial crisis interfered with the prosperity of the country. The fact that they are studying, officially, the evils complained of by the foreigners is proof that Argentines recognize some merit in them. There is some justification in the claims of both sides, and it is now generally agreed that Argentina has a bright future, though it will not be a sudden development. It will be a slow, laborious evolution, because of the character of the population out of which agricultural progress must be worked.

### PLOWING.

One of the advantages enjoyed by the Argentine farmer is that he may plow the land almost any time in the year. Experience has shown that Argentine wheat land should be plowed twice to secure the best results after the first two years of cropping. The first plowing is done in February, March, or April, and the land is harrowed once or twice after plowing and the weeds burned. The second plowing is done in May, June, July, or August, early in the north and later in the south. It is immediately harrowed and the seed sown. If the sowing is broadcast, it is harrowed again to cover the seed, and sometimes rolled just as the plants are coming up. Where drills are used for sowing, the land is usually rolled. Authorities advise farmers to plow 8 or 9 inches deep the first time and not more than 4 inches deep the second time, thus bringing up the rich soil and burying the weeds. The Department of Agriculture and all agricultural authorities in Argentina who have given the subject careful study urge deeper plowing after the first two years, gradually increasing the depth from 4 to 9 inches. It is agreed by all well-informed farmers that this policy is necessary to insure against losses in dry seasons, to exterminate weeds, and give the plants greater strength. To be sure, it occasionally happens that in a wet season the shallow-plowed land will give very good results, while the wheat on land plowed 7 or 8 inches deep will grow stalks too rank and not give as good returns as the badly farmed land. But this is an exception that does not excuse the slovenly farmer for his ruinous practices. In wet seasons the wheat may be overcome by weeds, even in shallow-plowed land.

### SOME BAD METHODS.

More than half the wheat in Argentina is planted on land that has been plowed only once, and that just before seeding. This is done from May to August, according to zone, and it is not always harrowed before seeding. When it is harrowed a light drag is used that only

scratches the ground a little and does not cover all the seed. The weeds gathered by the harrow are likely to be burned. The plowing is from 3 to 4 inches deep, badly done at that, in the haste to get over the greatest amount of ground possible. The furrows are crooked, of uneven depth and width, and look much as if they had been made with one of the primitive wooden plows still in use in the "back country" of the North. It looks more as if an American corn cultivator had been run through it than as if it had been really intended to plow it for planting. Under this system the weeds get a better planting than the wheat and often outgrow it, especially if rains come on after the stunted wheat has stopped growing. Then it is that wheat and linseed fields assume the appearance of vast green weed patches. The grain can not be seen 50 yards away and is frequently abandoned, or, being cut, is worth very little. Linseed, or flax, is often left lying in the fields waiting to dry---for no grain full of weeds can be stacked till the green weeds have dried -and continued rains ruin it before it has a chance to dry.

### EXAMPLE AND PRECEPT IN FAVOR OF DEEPER PLOWING.

The advice to plow deep has been most followed in the Territory of Chubut, where the wheat farmers were mostly Welshmen, and the largest yields of the best wheat have been secured there.

In a bulletin of the Department of Agriculture, issued in March, 1901, farmers are urged to begin their plowing before the end of March, to destroy the weeds before they go to seed as well as to improve the condition of the ground. In clean stubble 6 to 9 inches is said to be deep enough, but in poor land 11 inches is better for the first plowing; the poorer the land the deeper it should be plowed. The second or cross plowing is 4 inches deep. Experience and numerous failures have shown, this report says, that one plowing is not sufficient for wheat, and that it is only on exceptional land in exceptional years that it has produced good crops.

Another Argentine agricultural writer, Eduardo T. Larguía, Agronomist in the Department of Agriculture, says in an official report:

I am tired of seeing fields of practically the same land belonging to different proprietors giving opposite results; some filling to the brim the farmers' cup of success, while others go to ruin. In the first the land has been well worked, and in the others not: And these men will not learn. Ask them why they failed and they will say it was their luck.

Neither do they understand nor observe climatic influences. The ignorant colonists charge everything to this or that trifling circumstance and go on in the same old way, charging it all up to Providence, instead of profiting by the experience of more intelligent farmers who have adopted improved methods and secured better results.

The preparation of the land is most important to give strength to the plants. To plow 3 or 4 inches deep after the second or third crop is only to develop bad weeds. Farmers should plow deeper and bring up the valuable and unused constituents of the soil—bring up the virgin soil and bury the bad weeds. It is the

only way to obtain abundant harvests, maintaining the fertility of the soil without the use of manure, and it is the practice of intelligent farmers. In many fields it is noticeable that where good is separated from bad by nothing but a wire fence, success was secured by deep plowing—making the difference between strong and weak plants, clean fields and those full of weeds. With deep plowing plants are strong to resist heat, drought, excessive humidity followed by burning sun, and hot north winds, and all other climatic changes.

All this good instruction is lost to those who most need it, for they either can not or will not read.

#### HEAVY RAINS AS A HINDRANCE.

Plowing is sometimes retarded and seriously interfered with by excessive rains in the fall and winter, and also by long droughts that bake the ground so an ordinary plow can not be used. Disk plows from the United States are being introduced and used with great success in this emergency, and also for breaking up new land.

#### HARD WORK AT PLOWING TIME.

Plowing and harrowing are both done by all the members of the Italian farmer's family who are strong enough to follow a team of oxen, horses, or mules about the field or to ride a leader. This includes both sexes, old and young, and during the plowing, planting, and harvesting seasons they work very hard. Moonlight work is not uncommon, and sixteen hours a day is too little for these hardy people when they have work to do. Two or 2½ acres will be plowed by one man with a single plow, or twice as much with a double plow, if he can get changes of bullocks. They make up for this hard work by loafing between seasons, watching the wheat grow, and doing nothing else, having no other crop to occupy their time, till they are driven mad by the exigencies of harvest. Then at it again, night and day, the whole family, till the grain is stacked.

### SEEDING.

#### QUALITY OF SEED USED.

Another of the worst of the Argentine farmer's mistakes is his carelessness about seed. The one who takes any care at all about saving seed is the exception. Ordinarily sufficient bags are taken from the pile indiscriminately after thrashing and put away to be sown the next year on the same land. They hardly ever even exchange seed, being afraid of being cheated. Many of the Italians and some of the Russians use the poorest they have for seed, or sell all their wheat if it happens to be good, and buy inferior wheat later, at a lower price, to be used for seed. This is, however, an unusually vicious practice. But year after year the same seed is sown on the same land without effort to change or improve it. The ignorance of many of the farmers is so great that they do not know and can not understand that it makes

any difference. The farmer of this class wants to make the thrashing machine run as fast as possible, regardless of the condition of the grain that comes out of it and is quite content with the seed it gives him, containing 10 to 15 per cent of impurities. No wonder his wheat field is converted into a great weed crop.

Much improvement has been noted in this respect during the past two years. Farmers are learning, slowly, that good seed produces better wheat than poor seed. They are exchanging seed more, as they learn that it is better to have new seed, and they are taking more care in the selection, a few going so far as to plant and thrash seed wheat separately. It is quite difficult to get seed wheat that is absolutely pure, however, as most of it is more or less degenerated, mixed with other varieties or with foreign seeds, or all three. Some new varieties are likely to spring out of these combinations. Indeed, some have been practically made over, notably Barletta and Russian, which are now said to be much improved over the original seed.

### METHODS AND TIME OF SOWING.

Seeding is done mostly with broadcast seeders, though much is still done by hand. In 1901 it was estimated that 71 per cent was done with broadcast seeders, 12 per cent with drills, and 17 per cent by hand. In the mild climate of Argentina there is not the difference in winter and spring wheat that there is in the United States. Seeding begins at the end of autumn, about May 15, in the north and center of Santa Fe, Entre Rios, and Cordoba, continues in June and July in the south of Santa Fe, Entre Rios, and Cordoba and through the Province of Buenos Aires, ending before the middle of August in southern Buenos Aires and the Territories of Rio Negro, Pampa, Neuquen, and Chubut. In the latter, however, it often continues up to the end of August and sometimes to the middle of September. Taking the country over, the average and best seeding is done in June and July. Some farmers sow two varieties, some quick-ripening kind early, so they can cut it and get it out of the way before it shells and before the latter, usually Barletta, is ready. There is some chance in the time of sowing, which may be interfered with by a very dry or very wet spring, in which case the plants do not have time enough to mature before they are called upon to resist the burning sun of November and December, the blighting north winds and other trials of strength. The high temperature and hot north winds are interspersed with rains, and the plants, unless they have put their roots well down into the ground, are "cooked;" rapidly dried and shriveled grain is the result. This operation is called "amarillear los trigos"—to yellow the wheat. If the plowing has been well done in soil not worn out by wheat, and good seed is well planted, so it has a good chance to put roots down 10 or 12 inches to moist earth, the

Argentine wheat plant, especially Barletta, will probably resist these attacks, unless they last too long.

Seeding begins with 45 pounds per acre in May, continues with 54 to 63 in June, 63 to 76 in July, and finishes with 72 to 90 in August. The average is about 63 pounds, or a trifle over a bushel, per acre. Nearly everywhere the criticism is made by the best-informed men that too much seed is sown. Farmers are learning to sow thinner, but the amount they consider right, a bushel to the acre, is still said to be too much by the experts of the Argentine Department of Agriculture.[a] The Swedish farmers around Tandil, who are very successful and prosperous, plant 36 to 53 pounds per acre, while their Italian neighbors plant twice as much and do not do as well; but part of this is due to the fact that the Swedes plow 6 or 7 inches deep and the Italians only 4. A Danish farmer in this vicinity made $3,500 above all expenses in one season growing wheat on 375 acres with the help of one hired hand.

### IMPOVERISHMENT OF THE LAND.

The third principal criticism of Argentine wheat farming, as made by Argentines themselves, is that the land is exhausted by repeated wheat cropping year after year without change. Under the renting system, by which more than 60 per cent of the wheat is raised, colonists take good land, wear it out with wheat, and move on to other land, having no interest in the country, owning nothing they can possibly avoid owning, gathering up their few belongings and their many children and with their bullocks, horses, carts, and miserable pots, boxes, and beds, and perhaps a few simple implements, travel until they find a new place to wear out by their ruinous methods. In his study of the wheat fields of the Province of Buenos Aires, Senor Larguía, previously quoted, says:

> The land is taxed without rest or change for the same qualities until the time comes when it can no longer furnish the required constituents in sufficient quantities. The yield diminishes and the quality deteriorates, while the land is filled with noxious weeds in proportion as the wheat grows poorer each year. In most parts, especially in the west, the crop is poorer every year after the third..
>
> It is generally known that our soil does not need fertilizers, but it is a bitter truth that under the methods referred to it is only sought to use up the fertility of the soil and to render it useless for cultivation for many years. These colonists impoverish the lands and then abandon them to seek other lands to exhaust, leaving the old land overgrown with weeds. These practices will surely lead to a change in agricultural methods, which, though slow in coming, can not be long delayed.

From all parts of the Republic complaints of this kind are heard, though the change and improvement have already begun and wheat lands are being given a rest after three or four years, and put into alfalfa, or Indian corn is alternated with wheat. This may be done

[a] In the United States 5 pecks is the usual amount, but it is sometimes more.

for many years. It must be understood that mixed farming, as we know it in the United States, is very little understood or practiced in Argentina. As a rule a farmer, especially a renter, is either a wheat grower or a maize grower, and seldom both unless he is farming his own land. Then, perhaps, he has both, also linseed[a] and some alfalfa, and occasionally some cattle. Land is rented to colonists for three years under an agreement to sow alfalfa with the wheat the third year, the alfalfa seed being furnished by the landowner.

In some regions land endures wheat longer than in others; the less sandy, the longer it will produce wheat, as a rule. Some land has produced wheat for twenty consecutive years without fertilizing and given fair crops. But the general rule of three or four years, and then a rest of about the same length of time, is the safest. Many colonists are permitted to stay six or seven years, after which, in many cases, nothing but weeds will grow on the land. Some landowners have brought ruin upon themselves by such mismanagement.

### MISTAKES TO BE CORRECTED.

All authorities on agriculture in Argentina agree that three great mistakes must be corrected before the country can do its best for the farmer. He is urged: First, to plow deeper; second, select the best of seed; third, rotate crops.

In all these things progress is being made, especially as wheat growing is gradually being forced south into a more favorable zone, but it is a slow progress. Estancieros (stock raisers), who have hitherto taken no interest in general agriculture, are doing their part in the development. They are finding it very profitable to have their natural-grass land broken up by renters, who will pay a good rental for wheat land three years, leaving it at the end of that time covered with a good growth of alfalfa.[b]

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[a] Farmers are often also growers of linseed, or flax. It is an important and profitable crop in Argentina. The area harvested in the season of 1901–1902 was 1,592,821 acres, which yielded 14,370,645 bushels, of which 13,421,959 bushels were exported. The export proceeds were $17,216,519, an increase of $1,281,220 over the previous year, though the increase in the amount exported was only 83,027 bushels. The market price in Argentina during 1902 was from $1 to $1.50 United States currency per bushel. The price in 1903 was about 95 cents per bushel. The exports from Argentina for 1903 were, according to the statistical bureau of the Argentine Department of Agriculture, 23,118,773 bushels. The Review of the River Plate gives the amount as 26,035,143 bushels. The crop of 1902 was greater than any previous year, and the crop of 1904 promises to fully equal, if not exceed, that of 1903.

[b] Señor Ronaldo Tidblom, Director of Agriculture and of the Bureau of Animal Industry of Argentina, regards this as a highly satisfactory arrangement for the estanciero. Being himself a stock breeder and farmer on a large scale, his practical experience is valuable. He says it is "a means of increasing five, ten, and even fifteen fold the carrying capacity of thinly grassed, rough camps, giving a profit during

## CLIMATIC ADVANTAGES AND DISADVANTAGES.

Aside from the richness of the soil in certain parts, the Argentine farmer's greatest advantage is in his ability to work his land at almost any time of the year he chooses. Another thing is the low cost of caring for his animals, even his work horses and oxen. It is not necessary for him to spend much time or money preparing feed to carry them through the winter, as the wheat farmers in the United States are obliged to do. The climate permits him to work his animals through the winter with little or no dry feed, unless it is a dry, cold winter and the pastures become bare. The dry winter, however, is the best for the wheat farmer.

### UNFAVORABLE CONDITIONS.

If a wet summer and fall are followed by a warm, open winter, the wheat and linseed are likely to be choked to death by weeds, which come up in appalling abundance under such conditions and get ahead of the cereal plants. If there is much rain in a warm winter, these conditions are of course made worse. Badly prepared, shallow-plowed land punishes the slovenly farmer at such times for his neglect.[a]

The cold fogs and late frosts that occasionally come in November or early December, followed by hot sun and winds, make fearful havoc with wheat that previously gave promise of enormous yield before this calamity. The hot winds that sweep across the plains from the north in November and December, accompanied by clear skies and a burning sun, severely test the quality of the farming and the vitality of the wheat plants. Unless the plants have good roots and are strong and healthy they will not survive these hot weeks, but will shrivel, and will not be worth cutting. These winds are much less severe in the south. There drought is more feared.

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the transformation." Señor Tidblom gives a practical experiment of his own, as follows:

"I have sown 42,000 acres of 'camp' with wheat and alfalfa in the south of Cordoba and Santa Fe, where I could only keep 1,200 breeding cattle per kilometric league (6,177 acres), with a gross profit of $308,012, with a total expense of $208,741, and a net profit of $99,271, said camp having now a carrying capacity of from 6,250 to 7,000 breeding cattle per kilometric league. The pastoral grass is burned, the land plowed and well harrowed in October, November, December, January, and February; it is plowed deeply a second time in May, June, or July, harrowed, the wheat seeded thin, and again harrowed; the alfalfa is then seeded at 22 pounds per acre, the land harrowed with chain harrows, and then rolled. The alfalfa germinates more or less at the same time as the wheat; the wheat is harvested in December and cut as low as possible, and the land is allowed to lie until the following September or October, our spring, when it is eaten bare by cattle and is then ready to produce hay or pasture, as may be desired."

This is one method, but there are others. The alfalfa seed is often sown with the wheat, the seeders being arranged to handle both seeds at the same time.

[a] See under "The land and its treatment."

## CLIMATIC OBSERVATIONS FOR A TERM OF YEARS.

The table given herewith shows the average climatic conditions prevailing in 24 representative stations of observation in Argentina for a term of years. The observations were made by the National Weather Bureau, which is under the direction of Mr. Walter G. Davis, an able scientist, formerly a resident of the State of Vermont, who has been about twenty-six years connected with this service. It is now well organized and efficient, issuing daily maps from telegraphic reports from several hundred stations. Some of the station averages given in this table represent observations for twenty years or more, while others have been established for only four or five years. Most of them have been established at least ten years.

*Data of climatic conditions in Argentina.*

| Stations. | Temperature. | | | | Rainfall. | | Wind. | | | | | | | | | | Clear days. | Partly cloudy. | Cloudy. | Thunderstorms in 10 years. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean. | Maximum. | Minimum. | Difference. | Quantity. | Number of days. | N. | NE. | E. | SE. | S. | SW. | W. | NW. | Calm. | Velocity in miles per hour. | | | | |
| | °F. | °F. | °F. | °F. | In. | No. | P.ct | P.ct | P.ct | P.ct | P.ct | P.ct | P.ct | P.ct | P.ct | | | | | |
| Staten Island | 43 | 66 | 14 | 52 | 56 | 252 | 11 | 4 | 1 | 7 | 15 | 16 | 15 | 25 | 6 | 16 | 6 | 151 | 208 | 335 |
| Rawson, Chubut | 55 | 102 | 14 | 88 | 10 | 67 | 7 | 7 | 8 | 8 | 5 | 13 | 26 | 12 | 14 | 9 | 81 | 244 | 40 | 5 |
| 16 de Octubre, Chubut | 50 | 97 | 3 | 94 | 18 | 58 | 1 | 1 | 3 | 1 | 5 | 7 | 20 | 3 | 59 | 5 | 62 | 188 | 115 | 0 |
| Bahia Blanca | 59 | 106 | 23 | 83 | 18 | 54 | 20 | 5 | 6 | 13 | 7 | 5 | 14 | 30 | 0 | 9 | 127 | 204 | 34 | 7 |
| Buenos Aires | 63 | 104 | 28 | 76 | 35 | 59 | 15 | 17 | 20 | 11 | 11 | 12 | 7 | 7 | 0 | 4 | 81 | 218 | 66 | 8 |
| Rosario de Santa Fe | 63 | 111 | 18 | 93 | 36 | 77 | 16 | 17 | 16 | 12 | 17 | 7 | 3 | 3 | 5 | 4 | 128 | 165 | 72 | 9 |
| Parana, Entre Rios | 66 | 108 | 30 | 78 | 37 | 50 | 23 | 10 | 22 | 10 | 21 | 3 | 5 | 2 | 4 | 5 | 193 | 131 | 40 | 16 |
| Ceres, Santa Fe | 68 | 115 | 19 | 96 | 30 | 59 | 12 | 24 | 17 | 12 | 20 | 3 | 1 | 1 | 10 | 7 | 45 | 221 | 99 | 18 |
| Concepcion del Uruguay, E.R | 64 | 100 | 32 | 68 | 46 | 54 | 16 | 15 | 17 | 14 | 15 | 9 | 6 | 4 | 4 | 6 | 135 | 169 | 61 | 11 |
| Concordia, Entre Rios | 66 | 108 | 30 | 78 | 42 | 56 | 15 | 21 | 16 | 14 | 13 | 10 | 4 | 5 | 2 | 8 | 163 | 154 | 48 | 12 |
| Goya, Corrientes | 68 | 104 | 32 | 72 | 39 | 39 | 17 | 17 | 11 | 22 | 19 | 8 | 2 | 4 | 0 | 4 | 202 | 111 | 52 | 2 |
| Corrientes | 72 | 108 | 37 | 71 | 47 | 48 | 26 | 9 | 13 | 8 | 40 | 2 | 1 | 0 | 1 | 4 | 150 | 148 | 67 | 3 |
| Formosa | 72 | 104 | 32 | 72 | 57 | 56 | 27 | 8 | 9 | 11 | 31 | 4 | 2 | 0 | 8 | 4 | 121 | 191 | 53 | 0 |
| Cordoba | 63 | 111 | 16 | 95 | 27 | 70 | 17 | 27 | 8 | 16 | 21 | 4 | 2 | 3 | 2 | 7 | 165 | 95 | 105 | 34 |
| Tucuman | 68 | 111 | 27 | 84 | 37 | 65 | 7 | 10 | 3 | 6 | 8 | 21 | 2 | 2 | 41 | 1 | 128 | 138 | 99 | 5 |
| Santiago del Estero | 70 | 109 | 28 | 81 | 20 | 41 | 18 | 7 | 9 | 6 | 25 | 2 | 1 | 1 | 31 | 2 | 160 | 142 | 63 | 9 |
| Andalgala, Catamarca | 66 | 104 | 28 | 76 | 11 | 32 | 0 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 93 | 2 | 191 | 133 | 41 | 5 |
| Mendoza | 63 | 108 | 18 | 90 | 6 | 42 | 7 | 8 | 14 | 16 | 19 | 6 | 4 | 2 | 24 | 6 | 180 | 153 | 32 | 23 |
| San Juan | 66 | 111 | 28 | 83 | 2 | 16 | 7 | 3 | 2 | 9 | 53 | 3 | 2 | 2 | 19 | 5 | 196 | 140 | 29 | 9 |
| Salta | 63 | 95 | 25 | 70 | 22 | 46 | 16 | 38 | 13 | 4 | 1 | 1 | 1 | 2 | 24 | 3 | 104 | 151 | 110 | 13 |
| Pampa Blanca, Jujuy | 70 | 104 | 30 | 74 | 22 | 51 | 21 | 11 | 1 | 1 | 5 | 24 | 3 | 7 | 27 | 4 | 103 | 153 | 109 | 0 |
| San Luis | 63 | 102 | 23 | 79 | 22 | 59 | 12 | 7 | 17 | 13 | 4 | 3 | 4 | 10 | 30 | 4 | 156 | 162 | 47 | 46 |
| Rio Cuarto, Cordoba | 63 | 102 | 25 | 77 | 28 | 68 | 36 | 7 | 2 | 10 | 16 | 4 | 4 | 19 | 2 | 7 | 133 | 154 | 78 | 42 |
| Chos Malal, Neuquen | 57 | 102 | 14 | 88 | 8 | 17 | 14 | 1 | 3 | 11 | 4 | 7 | 23 | 17 | 20 | 7 | 149 | 177 | 39 | 0 |

### ARGENTINE SEASONS.

The Argentine seasons are: Summer, December, January and February; autumn, March, April and May; winter, June, July and August; spring, September, October and November.

The average temperatures in distinctive parts of the country for the four seasons were as follows for a term of years:

*Average temperatures.*

| Stations. | January. | April. | July. | October. |
|---|---|---|---|---|
| | °F. | °F. | °F. | °F. |
| Goya | 77 | 66 | 57 | 67 |
| Tucuman | 76 | 66 | 54 | 68 |
| San Juan | 78 | 63 | 49 | 66 |
| Córdoba | 73 | 62 | 51 | 62 |
| San Luis | 77 | 59 | 50 | 64 |
| Rosario | 75 | 62 | 51 | 60 |
| Chos Malal | 71 | 55 | 45 | 54 |
| Buenos Aires | 76 | 63 | 51 | 60 |
| Staten Island | 48 | 43 | 37 | 41 |
| Rawson | 69 | 52 | 42 | 57 |

### ISOTHERMAL LINES.

The range of temperature in various parts of the country is best shown by the isothermal lines in the map accompanying this bulletin (Pl. IV). These indicate average annual temperatures from actual observations. No temperatures of deep valleys or high mountains have been included, but only such as fairly represent the region, without reduction to sea level.

The isothermal lines of summer, winter, and annual average, as drawn by the Argentine Weather Bureau after many years' observation, are as follows:[a]

#### SUMMER.

The isotherm of 77° starts on the Uruguay River in about lat. 31 S., runs through the upper edge of the Province of Entre Rios, central Santa Fe, and downward to the city of Cordoba, where it dips south to the lower part of San Luis and Mendoza, thence upward along the lower slopes of the Andes to Bolivia.

The isotherm of 75° begins at about lat. 33 S., runs west across the lower part of the Province of Entre Rios, thence southwesterly through the city of Rosario, across the southern edge of Cordoba and San Luis,

[a] The temperatures used to form the isothermal lines have been reduced to the level of the sea at the rate of 1° C. to each 200 meters of altitude, or 1.8° F. for each 656 feet. This does not affect the actual temperatures of the wheat region to any great extent, however, as all that part of the country is comparatively low, very little of it being more than 500 feet above the sea. The Centigrade thermometer is used exclusively in Argentina, but all statements of temperature used in this bulletin have been converted into Fahrenheit.

the northwestern corner of the Pampa, up through Mendoza, San Juan, La Rioja, Catamarca, and Salta to Bolivia.

The isotherm of 73° begins about lat. 33.5 S. and crosses the northern part of the Province of Buenos Aires, takes a southwesterly course through the central part of the Territory of the Pampa, and makes a curve from the central part of the Territory of Neuquen upward to about lat. 35 S.

The line of 72° starts at Buenos Aires, lat. 35 S., and follows a general southerly direction across the Province of Buenos Aires, the southwestern corner of the Pampa, the northwestern corner of Rio Negro, and central Neuquen to the Andes.

The line of 70° starts at the seacoast in lat. 37 S., runs southwest along the coast to lat. 40 S., whence it crosses the Territory of Rio Negro, dipping a little to the south, and up a trifle north of lat. 40 S. in Neuquen.

Autumn temperatures average in the Temperate Zone about 11 degrees cooler than in summer.

WINTER.

The isotherm of 70° runs from the southeast corner of the Territory of Misiones, in lat. 27 S., to lower Catamarca in almost a straight line, thence north to Bolivia.

The line of 57°, beginning in lat. 30.5 S., crosses lower Corrientes, central Santa Fe, northern Cordoba, south to the city of San Juan, and north to Bolivia.

The line of 55°, beginning in lat. 31 S., runs across Entre Rios to the city of Santa Fe, a little north of the city of Cordoba, southwest to the city of San Luis, through Mendoza northwesterly, and north to Bolivia.

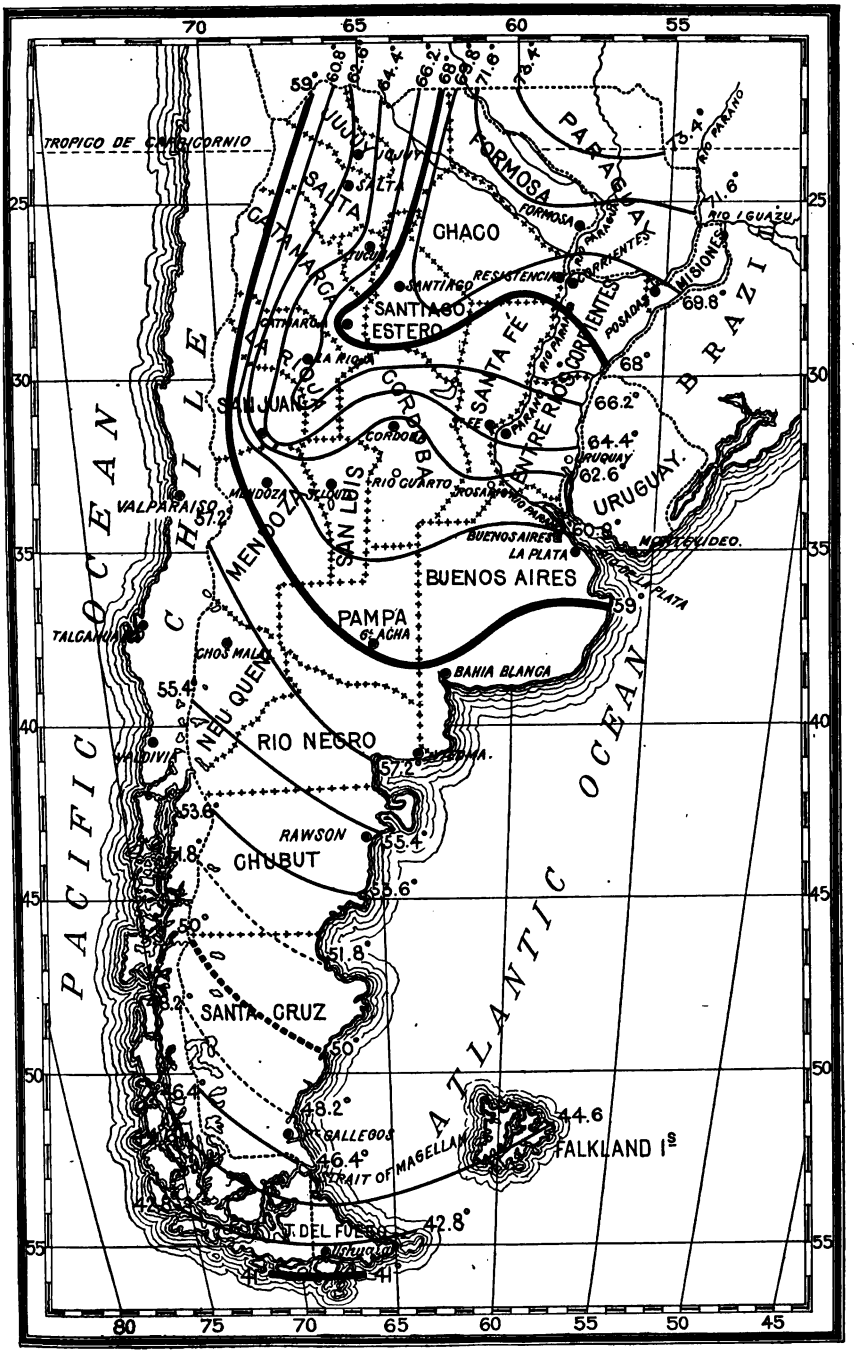
The isotherms of 54° and 52°, beginning in lat. 32 S. and 33.5 S., respectively, are nearly parallel with the line of 55°.

The isotherm of 50° begins about lat. 34.5 S., a few miles north of the city of Buenos Aires, runs northwest to the middle of the lower point of Santa Fe, thence southwesterly along the borders of Buenos Aires, the Pampa, Cordoba, and San Luis, and upward through Mendoza to about the same latitude as that of the starting point.

The isotherm of 48° starts on the coast about lat. 35.5 S., and dips downward through the province of Buenos Aires to a point about 50 miles north of Bahia Blanca, where it crosses the Pampa and Neuquen on a slight upward incline, ending in a sharp upward turn to lat. 37 S.

Below this the lines are more nearly east and west, both summer and winter. At lat. 39.4 S. the winter temperature is 46.4°. At lat. 44 S. it is 43°.

The spring temperatures average about 11° to 12° warmer than the winter temperatures.




ISOTHERMAL LINES, SHOWING ANNUAL AVERAGES OF TEMPERATURE IN ARGENTINA.

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ANNUAL AVERAGE.

The highest annual average is 75°. This is in the northern part of Formosa and Jujuy, near the Tropic of Capricorn. The temperature is about 2° cooler every 70 to 150 miles south. The line of 66° annual average runs straight across the northern part of Entre Rios, central Santa Fe, and downward to the cities of Cordoba and San Luis, curves downward 50 miles south of the city of Mendoza, and up to a point on the boundary due west of the last-named city. The isotherm of 63° goes across lower Entre Rios, just south of the city of Rosario, and due southwest along the borders of Buenos Aires, Cordoba, San Luis, and the Pampa, to Chos Malal. At La Plata the isotherm of 61° begins and runs a little north to central northern Buenos Aires, where it bears off to the southwest, through the Pampa a little south of the center, into Neuquen. Bahia Blanca is in the line of 59°, and from this point the lines are more nearly uniform, the temperature being about 2° warmer on the Atlantic coast than at the base of the Andes. It averages about 2° lower each 125 to 150 miles south until at the end of the continent, in about lat. 56 S., it is 41°.

HUMIDITY.

The summers in Argentina seem to be much hotter than they really are, because of the high percentage of humidity, which greatly heightens the effect of moderately high temperatures upon the human body. Humidity decreases from the northern to the southern parts of the country. In Buenos Aires and Rosario it is 78 per cent. In the city of Cordoba, 1,000 to 1,200 feet higher in altitude than the farming country south of it, the humidity is only 64 per cent. In the northern Provinces and Territories it goes up to 88 per cent. In the Province of Buenos Aires, where wheat farming is now most successfully carried on, the summer humidity averages not far from 75 to 78 per cent, making high temperatures very oppressive. The following is an extract from the Argentine Weather Bureau's report on this point:

It is not an uncommon occurrence in summer that the temperature of the air during the hottest hours of the day is considerably higher in the region of Chubut and Rio Negro than in Corrientes or the Chaco, 16° to 18° nearer the equator. In the first-named region, however, one scarcely feels the heat, whereas in the latter the temperature is very oppressive. This is explained by the fact that the temperatures of the wet-bulb thermometer are much lower in the southern Territories, when these phenomena are observed, than those recorded in the northern region. In the city of Buenos Aires a temperature of 95° is very rare, while in Cordoba it is not exceptional in autumn and spring and is frequently observed during the summer. In the first-named place this degree of heat causes a suspension of all labor that can be postponed, while in Cordoba it does not give the impression of being excessive, and work is carried on without inconvenience.

### RAINFALL.

Rainfall in Argentina is graphically shown by the accompanying map from the Argentine Weather Bureau (Pl. V), indicating the annual distribution of rainfall for a long series of years. From October to March is called the wet season and from April to September the dry season in that part of Argentina north of lat. 38 S. In Buenos Aires 56 per cent of the annual rainfall is in the wet season; in Corrientes, 65 per cent; in Cordoba, 86 per cent; and in Salta, 96 per cent. South of lat. 38 S. the distribution of rainfall is very even throughout the year.

Snow falls every year in the Territories of Santa Cruz, Chubut, Rio Negro, and Neuquen, but it rarely reaches the Province of Buenos Aires.

### WIND.

The effect of winds on temperature in Argentina is stated by Director Davis, of the Argentine Weather Bureau, as follows:

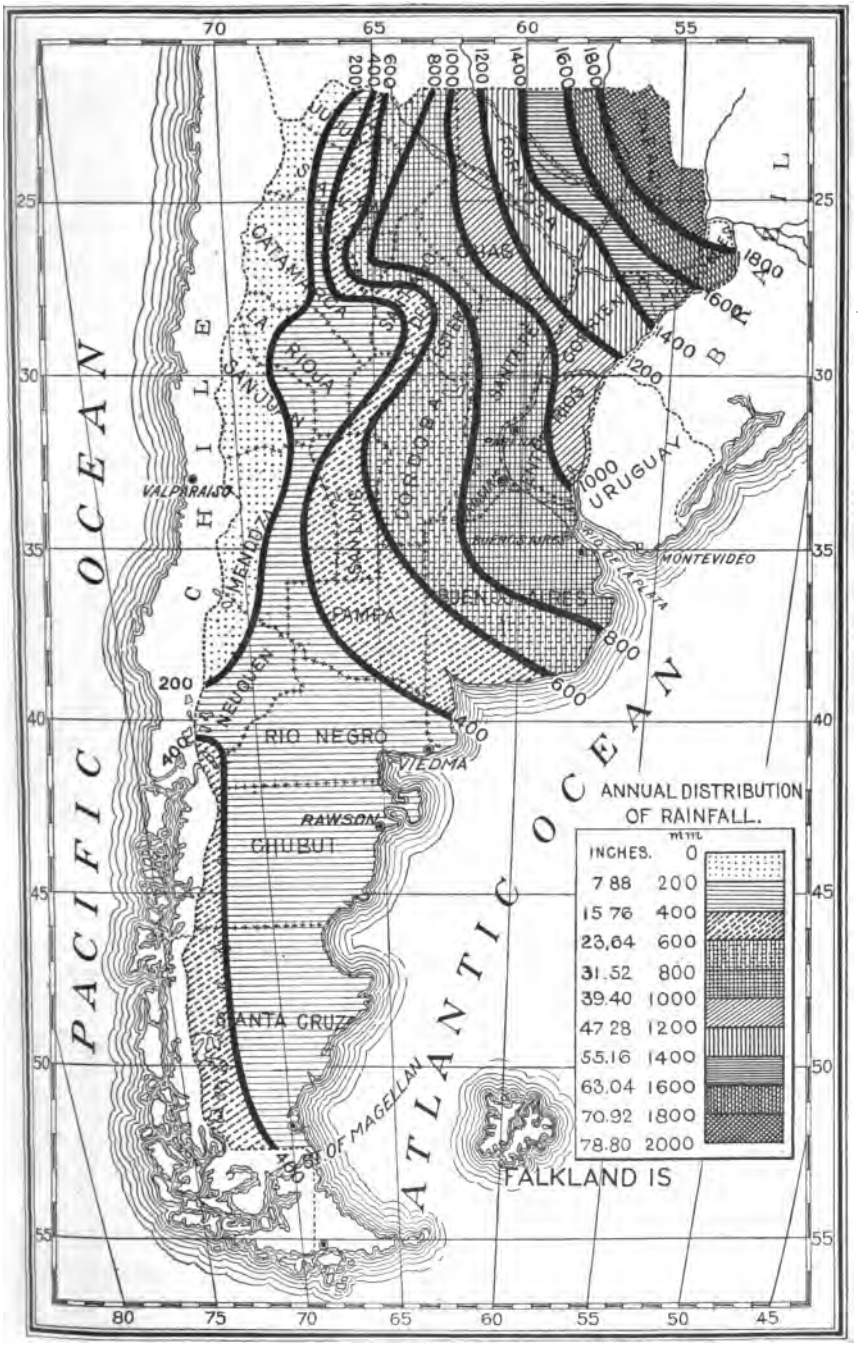
> The north winds are hot and the increase in the heat is, as a rule, proportional to the duration of the wind from this direction, while the south winds are cool, refreshing the air and relieving the suffocation produced during the successive days of north wind. In the Andine region the dry and hot winds are called zondas, which generally blow from north to northwest and at times with such intensity that respiration is difficult. These winds rise about midday and last till sunset, but at times they last two or three days without interruption, being strongest in spring, September and October. The changes of temperature after a severe zonda and the south wind which follows it are frequently as high as 45°. In the litoral and mediterranean regions the heat produced by the north wind generally terminates with a thunderstorm or a pampero. The pamperos in the litoral are more frequent in winter and spring. The change of temperature caused by the two winds is frequently from 27° to 36°.

### DISEASES AND INSECTS.

Smut and rust are the diseases which oftenest attack wheat in Argentina. The latter is not different from other wheat rust, and is favored by excessive humidity and heat combined, succeeding each other, the result of wet seasons and bad preparation of land. Change of crops is the only method that seems to have been effective in removing rust.

Until a few years ago, when Argentine farmers began to immerse their seed wheat in a solution of sulphate of copper, they had a great deal of trouble with smut. It is said to be most common to new land, and generally adds to the losses of wet seasons.

Locusts have wrought fearful havoc in Argentina in past years, but since 1897 have been very little felt. From 1889 until that time they laid waste more or less of the country. Effective means were found to destroy the locusts and hold them in check. Commissions were organized by the merchants of Buenos Aires, by the Province of Santa Fe, and by the National Department of Agriculture. The Buenos Aires




RAINFALL IN ARGENTINA, ANNUAL DISTRIBUTION, VARIOUS REGIONS.

commission secured the services of Lawrence Bruner, professor of entomology and ornithology in the University of Nebraska, and he spent about a year in Argentina studying the locusts and planning their destruction, in the year 1897. The private and Provincial commissions spent many thousands of dollars, and the National Department of Agriculture has spent over $5,000,000 in fighting locusts since the work was commenced. In 1897, 347,000,000 acres were visited by locusts, and 70 per cent of the crops were saved. In 1899 the invaded area was only 110,000,000 acres, and in 1900 it was reduced to 90,000,000, the damage to crops being small. In 1901 locusts were entirely absent from the wheat area and were found only in the Provinces of Salta and Jujuy and the Territory of the Chaco, where they did practically no harm. Every year since the locust limit has been pushed farther north. The insects come from Bolivia, the Territory of the Chaco, and from western Brazil. By constant watchfulness and well-directed energy in the northern Provinces during the winter, locusts have been kept from coming south into the wheat regions before November or December, when wheat is ripe. The invaders can then do much less harm to agriculture, and being in greatly reduced numbers, can be destroyed with comparative ease. But since 1900 the agricultural area of Argentina has been practically free from them. Alarming reports came from the north during the year 1903, to the effect that locusts were so numerous in Salta and even in some parts of Mendoza that they might again sweep over the farming country. This has not yet happened, however, though they have come farther south than for several years before, and may have deposited eggs that will be heard from this year.

Army worms, under various names, have done some damage to wheat. In 1891 they caused a loss in Entre Rios, estimated at 2 per cent, and in 1899 at 5 per cent. They have been felt in other places, but the total losses have not been large. Deep plowing, light sowing, constant watching for the appearance of the worms, and destroying them and all strange plants, burning all straw and stubble, and heavy rolling of the ground where the worms are found, have been the means adopted and found most efficacious for their destruction.

## VARIETIES OF WHEAT.

All the wheat grown in Argentina for export is semisoft, known there as bread wheat (*Triticum aestivum*). Only a comparatively small amount of hard wheat (*Triticum durum*) is grown for home use for the manufacture of "fideos," or macaroni and vermicelli, a food much in favor among Latin people, especially the Italians.

Contrary to the conditions in the United States, the hard wheat has been nearly all grown in the north in the warmest regions, where wheat is grown at all, chiefly in the Province of Entre Rios. Wheat

growing in the lower Territories of Chubut and Rio Negro, where the climate more nearly corresponds to that of our best hard-wheat region, has been but little tried. The experiments made, however, have given astonishing results. The yield of the irrigated wheat farms in the Chubut River Valley has averaged for ten years 38.83 bushels per acre, or more than three times that of any Province, except Buenos Aires, and twice as much as the best averages in that Province. The production there is small and the facilities for marketing very poor. The wheat raised there has brought the highest prices and has been of a very superior quality, having an established reputation in the English market. It has been grown by a Welsh colony, a large number of the members of which left in 1902–03 and went to Canada. The quantity produced by this territory has been so little,[a] the climate so rigorous, the population so small, and the region generally so unattractive that but little attention has been paid to it. The tendency of wheat growing toward the south and the general reaching out for more land has brought this region into better notice recently. Don Carlos Lix Klett, president of the board of trade of Buenos Aires, and one of the best authorities on cereals in Argentina, says that Barletta wheat harvested in San Fernando, near the city of Buenos Aires, and sown in Chubut, produced a distinct type of very superior wheat for flour. He attributes this extrordinary development to the cool climate and other favorable conditions and believes that there is a great future for this section. Chubut wheat took the gold medal at the Paris Exposition in 1889. The sample shown was Barletta of 62.15 pounds per bushel, and Señor Lix Klett says wheat may now be found in Chubut that will weigh 66.81 pounds per bushel. Like many other good things in Argentina, the development of this region has not been reached, because there was so much more land nearer the centers served by railways that seemed more attractive. During the past year several hundred Boer families from South Africa have gone into the territory, encouraged by the Government with cheap lands.

### SOFT OR BREAD WHEATS.

#### BARLETTA.

This is a variety brought from Italy, closely resembling American hard red wheat, though not so hard. It is the favorite sort in all parts of the country and has shown its superior adaptability to various Argentine conditions through many years. It produces fat, dark-colored, smooth, rich grains and does not degenerate as some other kinds do. It seems to stand more abuse and yet reward proper cultivation better than any other variety that has been given a thorough

[a] Not more than 5,000 to 10,000 tons annually for export.

trial in Argentina. One of the qualities that most commends it to the Argentine wheat farmer is that it will stand a long time after being quite ripe without being shelled out by the high winds. The man who has no one but his wife and children to help him can get this wheat harvested with much less loss than any other that he knows. As the average colonist has more land than he can farm well, and either can not or will not hire help, this is a strong point in favor of Barletta. It also counts with the man who is farming on a large scale, who is planning to use "strippers," or who, with whatever method he gathers his grain, finds it most difficult to get help enough during harvest time.

It is said of Barletta that it best resists changes of climate, drouth, and rust, and is a stronger plant than others, not so likely to be damaged by the extreme heat or by the cold, damp fogs and late frosts that sometimes come in November and December, when the wheat is just forming heads, or is in the milk, and cause great and unexpected losses. Estimates of probable yield are sometimes far from the truth, because fields that to-day promise abundantly and seem to be in perfect condition may to-night, or early in the morning, be visited by one of these frosts, or cold fogs, and be almost totally ruined. The danger from this cause is greatest in low lands, where there is a little depression.

This is the only variety that is grown from one extreme of the wheat-growing area, as far north as lat. 31 S., to the other, as far south as lat. 44 S., about 800 miles, giving, the Department of Agriculture says, "an average yield overtopping other varieties from 8 to 15 per cent in every year and in every region, from Chubut to the north of Santa Fe." It produces a much harder grain at the south, gives a better yield also, and is of a distinct type from the grain of the same seed grown in the northern regions. In the southern half of the Province of Buenos Aires Barletta is showing much better results than in Santa Fe, which a few years ago was supposed to be the only place to raise wheat. The wheat of western, central, and southern Buenos Aires is harder, cleaner, and better in every way than that of the north.

Millers in Argentina, in Brazil, and in Europe prefer Barletta, though they often mix French, a softer and whiter wheat, with it to give it color. An analysis of Barletta made in 1891 by Dr. P. N. Arata, the distinguished chemist of the city of Buenos Aires, from a sample from the west of the Province of Buenos Aires, is as follows:

| | Per cent. | | Per cent. |
|---|---|---|---|
| Water | 13.50 | Gluten and dextrine | 1.90 |
| Ash | 1.93 | Oil | .65 |
| Starch | 60.30 | Woody fiber | 4.65 |
| Gluten, dry | 17.07 | | |

"French wheat at the same time was giving only 10 to 12 per cent gluten," says Don Carlos Lix Klett, "and I think now Barletta has improved so that it will give 19 per cent gluten."

In 1889 the best sample of Argentine Barletta that could be procured for the Paris Exposition weighed 62.15 pounds per bushel. In 1890 one was shown weighing 63.70 pounds per bushel. In 1898, in London, the best sample weighed 64.48 pounds per bushel, and at the exposition in Buenos Aires in May, 1903, the prize specimen weighed 66.19 pounds per bushel, while many others were shown weighing from 64.48 to 65.64 pounds per bushel, and the Chubut product, none of which was shown in the exposition, is said to weigh as high as 66.81 pounds per bushel, though I can not vouch for this. The development and improvement of Argentine Barletta is certainly established. Its uniformity is another quality that recommends it strongly.

### RUSSIAN.

Next to Barletta in popularity, in the Province of Buenos Aires and with exporters, is the Russian wheat, which is similar to Barletta in being a hardy plant, resistant to frost and rust and yielding well. It is also of a dark color, about the same hardness as Barletta, and also contains a high percentage of gluten and is highly prized as a flour producer. It is grown almost exclusively by the Russian colonists around Coronel Suarez, and it gives very good weights there and elsewhere in the west and south. It gives from 60.59 to 65.25 pounds per bushel. Ripening in less time than Barletta, it has the disadvantage of shelling out very easily when ripe, so it is necessary, in order to avoid loss, to harvest it more promptly.

### HUNGARIAN.

The third variety in commercial importance is Hungarian, of more recent cultivation in Argentina. It is a heavy wheat that has given excellent results, as high as 65.80 pounds per bushel in the west, near Drabble, 267 miles west of the city of Buenos Aires. But it is not as uniform or reliable as either of the other export varieties named. Good specimens generally give from 60.59 to 62.92 pounds per bushel. It comes up early and grows rapidly, but these advantages are of comparatively small importance in Argentina. It ripens rapidly and the grain falls off easily. It is not as hardy a plant as Barletta or Russian and, like Russian, does not do as well in the north as in the south.

### FRENCH.

A considerable quantity of French wheat is still grown, though it is decreasing in favor of the harder, stronger varieties previously named. It is light in color and light in weight and is much softer

than the others. It hardly ever reaches 64.48 pounds per bushel, generally gives 59.04 to 62.15 pounds per bushel for good specimens. It grows rapidly and ripens quickly, shelling out very easily. French wheat gives whiteness to flour, but contains a comparatively small percentage of glúten. It yields well under favorable conditions, though it is liable to smut and rust. It must be sown earlier than the harder wheats, so it may ripen before the extreme heat comes on to absorb its vitality and shrivel its grains before they mature. Generally it does not bring quite as good prices as the three kinds previously mentioned, as it is not exported.

### OTHER KINDS OF BREAD WHEAT.

Among other varieties less grown are Saldome, which, though not heavy, has a high flour value and the comparatively small offerings always bring good prices. It is said to resemble "White State" wheat of the United States.

Tusela is a small-grained, gray-backed sort, not so rich in gluten, and valued for giving color to flour. It is a rapid-growing variety.

Italian is another precocious variety, and, like Saldome and Tusela, the grains do not stay on the stalk long after they are ripe. This defect is so great in Argentina as to outweigh several good points with the farmers who depend upon their own efforts and those of their families to gather their harvest; and this is the case with a very large majority. Like the French wheat, Italian must be sown early to give time to ripen in advance of the heated term. The latter two varieties should be cut eight or ten days before they are quite ripe, to guard against losses by shelling out.

Piedmontese is a new Italian variety of great promise. It is very much like the favorite red Barletta, and in 1903 gave enormous yields of good, heavy, uniform quality. One farmer raised a large quantity that gave 37.77 bushels to the acre, the wheat weighing 63.70 pounds per bushel. This brought the top price in the market and much of it was sold for seed at 20 per cent more than the highest market price.

### MACARONI WHEATS.

An enormous amount of macaroni and vermicelli is consumed in Argentina, and 90 per cent of it is made in the country. For this purpose three varieties of hard wheat are grown. The principal one is Candeal, which is more valuable for macaroni, and is a very hard, rice-like grain, though it is exceeded in yield by Anchuelo, another hard macaroni wheat. The third variety, not so much grown, is Tangarro. These hard wheats are grown in the northern and hottest parts of the wheat region, especially in the Province of Entre Rios. The prices for this kind of wheat vary more than for others, depending on the demand, which is more limited, and on whether the grain is suited to the special use of making macaroni.

### EXPERIMENTS WITH FOREIGN SEED.

During the season of 1902–1903 several samples of Russian and Algerian seed wheat from the Bureau of Plant Industry, United States Department of Agriculture, were distributed in Argentina for trial. Only a few have been reported upon, and several of these happened to be in places where there was more or less of a crop failure, owing to the late frosts, dry spring, and subsequent wet weather that stimulated the growth of weeds after the grain had practically stopped growing. The samples were of one quart each.

A specimen of winter wheat from Algeria was tried by Rodolfo Funke, who owns and operates a very large farm a short distance north of Bahia Blanca. Mr. Funke says of his experiment: "On account of the extreme drought that we suffered the wheat is very light, but in view of the yield, showing that it has resisted frosts and drought exceptionally well, I think it is worth further trial. The other samples sent me resulted in nothing, and I think they were killed by the frost." The other samples sent to Mr. Funke were: Crimean, from northern Taurida, Russia, and Pelissier, a macaroni wheat from Algeria. The yield from the quart harvested was 10.14 pounds.

A sample of Kubanka macaroni wheat from Uralsk, Russia, was tested by Mr. Norman J. Hall, a North American farmer, who has about 18,000 acres in wheat near Arias, in southeastern Cordoba. The drought in the spring interfered with the growth of this wheat, which was planted late. The quart of seed resulted in only 7.16 pounds, hand picked, but the wheat was of a very fair quality. A hailstorm added to the losses in that vicinity, so the farmers thereabout were getting only from 10 to 18 bushels to the acre, depending upon how hard they were hit by the hail. A few went as low as 5 bushels to the acre where the hail was the worst. The experiment shows that under normal conditions the variety would do well in that locality. Four kinds of Russian winter wheat sent to Mr. Hall gave no result.

### COST OF PRODUCTION.

The most difficult feature of the study of wheat production in Argentina is to tell what it costs. We may arrive at some idea of the average value of farm land and rentals of the same; we may learn what labor generally costs for various purposes; but the price of labor fluctuates so much and different farmers, with different ideas and under different conditions, give such widely varying estimates of the amount of labor required that a satisfactory estimate can not be made. The cost of the labor necessary to produce wheat in Argentina is still more difficult to estimate because three-fourths of it is performed by the members of the farmers' families, young and old, of both sexes. It is this fact, aside from the advantages of soil and climate, which enables them to overcome the heavy cost of getting to market,

shown in detail under the heading "Marketing." Farmers are not always willing to give information, fearing it is to be used as a basis for taxation. The Government statistics of acreage and yield come from the thrashing-machine operators. The variety of terms of rental adds to the difficulty, for so many different bases can not all be accounted for. Methods are constantly changing and developing and are likely to do so for several years. As expensive mistakes are corrected and losses avoided, better farming will be done, costing more per acre, but producing an increased yield sufficient to pay the added cost several times. So the items that now enter into the cost of a bushel of wheat, either on the farm or at the seaport, will be greatly changed in a few years. The aggregate ought to be less unless the value of land and rental charges go up unprecedentedly, and the profit to the farmer will be greater in proportion to his intelligence.

### COMPARISON OF ESTIMATES.

Many estimates of the cost of producing an acre of wheat in Argentina have been made by officials and others who have given the subject careful attention. Following is a tabulated comparison of three of them, exclusive of the item of rent or interest on value of land, values being expressed in United States currency per acre.

The first (A) is the estimate of Señor Tidblom, on a yield of 18 bushels to the acre, raised 6 miles from the station. The cost of hauling is much too low, if it has to be hired. It is presumed in this case that the farmer hauls his grain to market himself, which is not always done. The second (B) is the estimate of Señor E. Lahitte, Director of the Statistical Bureau of the Department of Agriculture, on a yield of 22 bushels to the acre, and the distance from the railway station is not given. The third (C) is the estimate of Mr. Glynne Williams, an English estanciero, whose careful estimates follow. His large farm is located 21 miles from Coronel Suarez, on the Southern Railway, in the Province of Buenos Aires, and this estimate is on the basis of a yield of 16 bushels to the acre. It is an actual record of the cost of producing the crop on 3,678 acres in the season of 1902–1903 with hired help, most of it on contract. The records have been very carefully kept and are trustworthy. Mr. Williams owns an American thrashing machine for his own use.

*Cost of producing one acre of wheat.*

| Items. | (A) | (B) | (C) |
|---|---|---|---|
| Plowing, harrowing, rolling, and sowing | $0.77 | $1.11 | $1.80 |
| Seed | .78 | .77 | |
| Harvesting and stacking | .81 | 1.42 | 2.12 |
| Thrashing | 1.75 | 2.50 | 2.24 |
| Bags | .60 | .69 | |
| Hauling to railway station | .22 | .91 | .87 |
| Total per acre | 4.93 | 7.40 | 7.03 |

These estimates harmonize better than appears at first, for they represent different kinds of work—more by the farmer himself in (A) and (B) than in (C)—and the difference in yield per acre affects the cost of thrashing, bags, and hauling. Mr. Williams, owning his machine, saved the large profits of the thrasher, and was better able to control the operation of the machine and got better work and cleaner grain from it. From all the information gathered, these estimates are believed to be as nearly correct as can be made.

### A DETAILED FARM RECORD.

Mr. Williams has kindly given the details of his wheat-farming operations for two years, and the essential facts are presented herewith, the measurements and valuations all reduced to United States equivalents. This is a reliable statement of what has actually been done in one of the best wheat districts in Argentina.

For the harvest of 1902–1903, which was below the average and was considered a poor year in that section, Mr. Williams found that his average net result per acre was $0.67 on 3,778 acres. Other items from his statement are:

Wheat sold and kept for seed (total product), 60,410 bushels, of which 3,674 bushels were kept for seed.

Average yield per acre, 15.98 bushels; highest, 17.47; lowest, 14.72.

| | |
|---|---|
| Value on the estancia | $33,871.51 |
| Value of wheat sold in Coronel Suarez | 35,794.19 |
| Cost of cartage to Coronel Suarez, 21 miles, 5.44 cents per bushel, and commission on receiving and selling, about 0.9 cent per bushel | 3,600.47 |
| Other expenses, including peones, guía de campaña, and storage | 521.82 |
| Gross proceeds per acre | 8.96 |
| Expenses per acre | 8.29 |
| Net profit per acre | .67 |
| Expense per acre: | |
| Rent | .71 |
| Interest, depreciation in value of implements, and repairs | .89 |
| Hail and fire insurance | .39 |
| Seed and preparation of land | 1.80 |
| Pasturage for plow horses | .18 |
| Harvesting, including twine for binders | 2.12 |
| Thrashing and bags | 2.20 |
| Total expenses | 8.29 |
| Seed and preparation of land: | |
| Plowing | .8012 |
| Twice harrowing | .1780 |
| Sowing and bush harrowing | .1780 |
| Or drilling | .1424 |
| Curing and carting seed | .0356 |
| Total | 1.1928 |
| | or $1.1572 |

| | |
|---|---|
| Seed and preparation of land—Continued. | |
| Seed, 0.7137 bushel per acre | $0.512 |
| Seed, 0.7732 bushel per acre | .555 |
| Seed, 0.8921 bushel per acre | .640 |
| Cutting and stacking: | |
| Day men, wages and food, to cut | .3027 |
| Contractor, for stooking, carting, and stacking, with food | 1.4779 |
| Total, except twine | 1.7806 |
| Cost of binding twine, furnished by the farmer, per bale | 7.48 |
| Hail insurance[a] | .2172 |
| Fire insurance | .0174 |
| Proceeds per acre: | |
| Net average per acre | .67 |
| Lowest average per acre | .279 |
| Highest average per acre | 1.702 |
| Average value on farm per bushel | .5604 |
| Average cost of production per bushel | .5185 |
| Net profit per bushel | .0419 |

The previous season, 1901–1902, was a better wheat season in this district, and the accurate records kept by Mr. Williams give a good idea of the wheat-raising business in a fairly good year. The following table gives the details of the operations "on account of the estancia"—that is, land farmed by the owner exclusively on that account:

*Profits of wheat raising on owned land.*

| Land sown and harvested exclusively for account of estancia. | Acres. | Bushels. | Actual value obtained in Coronel Suarez. | Result per acre. | | Expenses per acre. | | | | | Net result per acre. | Value in Coronel Suarez per bushel. | Cost of production per bushel. | Net profit per bushel. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Bushels. | Value. | Seed and preparation of land. | Harvesting and binding twine. | Threshing and bags, at $0.1317 per bushel. | Cartage to Coronel Suarez, 21 miles, at 22 cents per bag.[b] | Total. | | | | |
| Tract No. 1 | 585.63 | 9,817 | $6,438.96 | 16.839 | $10.99 | $2.67 | $1.99 | $2.21 | $1.25 | $8.12 | $2.87 | $0.655 | $0.482 | $0.173 |
| Tract No. 2 | 398.45 | 11,153 | 7,749.93 | 31.412 | 21.83 | 2.76 | 1.99 | 4.14 | 2.20 | 11.09 | 10.74 | .694 | .353 | .341 |
| Seed[c] | ..... | 1,363 | 947.32 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Tract No. 3 | 425.01 | 8,441 | 5,672.00 | 19.868 | 13.35 | 2.58 | 1.99 | 2.62 | 1.44 | 8.63 | 4.71 | .671 | .434 | .237 |
| Tract No. 4 | 494.20 | 9,906 | 5,973.49 | 20.044 | 12.09 | 1.83 | 1.99 | 2.64 | 1.59 | 8.05 | 4.04 | .603 | .401 | .202 |
| Tract No. 5 | 847.56 | 9,119 | 6,257.02 | 18.467 | 12.68 | 2.58 | 1.99 | 2.43 | 1.33 | 8.33 | 4.35 | .686 | .451 | .235 |
| Seed[c] | ..... | 6,533 | 4,487.65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total | 2,750.85 | 56,335 | 37,526.37 | 20.479 | 13.64 | 2.49 | 1.99 | 2.70 | 1.50 | 8.68 | 4.96 | .666 | .423 | .243 |

[a] Neither hail nor fire insurance is usually taken out in this locality, as the expense is considered too high and the risk very small.

[b] These bags held a small fraction less than 3 bushels, so the cost of cartage per bushel was a trifle over 7 cents. At present grain bags hold less, about 155 pounds.

[c] Seed not sold; market value given.

NOTES ON PROFITS FROM WHEAT ON OWNED LAND (p. 57).

Tract No. 1 was about three-fourths new land and one-fourth second year. About half of it is rather low. It was sown in June, August, and latter part of September with 78.51 pounds per acre.

Tract No. 2 was mostly land plowed for the first time the previous spring and left fallow during the summer. There was a little new land also. It was sown during May and June with 53.53 pounds of wheat and 11.59 pounds of alfalfa per acre. The amount kept for seed is valued at the price of that sold.

Tract No. 3 was all new land. About 71 pounds of seed per acre was drilled in during July and August.

Tract No. 4 was about two-thirds third crop and one-third second crop of wheat. It was a piece taken over from a colonist and was full of oats, which accounted for the low price. It was sown with 80 pounds of wheat and 18 pounds of alfalfa per acre, sown broadcast at the end of August.

Tract No. 5 was all new land. About 71 pounds of wheat to the acre was drilled in from June to September. The amount kept for seed is valued at the price of that sold.

Following are the records of four of Mr. Williams's "medianeros," or renters on shares, showing the difference in the cost of the two methods of growing wheat:

*Profits of wheat raising on rented land.*

| "Medianeros." | Acres. | Bushels. | Actual value obtained in Coronel Suarez. | Result per acre. | | Expenses per acre. | | | | | Net result per acre. | Value in Coronel Suarez per bushel. | Cost of production per bushel. | Net profit per bushel. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Bushels. | Value. | Seed and preparation of land. | Harvesting and binding twine. | Thrashing and bags at $0.1317 per bushel. | Cartage to Coronel Suarez, 21 miles, at 22 cents per bag.[a] | Total. | | | | |
| A.—2d year | 200 | 4,910 | $3,155.09 | 24.55 | $15.78 | $1.78 | $2.25 | $3.23 | $1.80 | $9.06 | $6.72 | $0.6425 | $0.3690 | $0.2735 |
| B.—3d year | 469 | 8,707 | 5,949.68 | 18.57 | 12.69 | 1.78 | 1.29 | 2.44 | 1.36 | 6.87 | 5.82 | 0.6833 | 0.3701 | 0.3132 |
| C.—1st and 2d years | 702 | 13,636 | 9,445.22 | 19.42 | 13.45 | 1.78 | 1.99 | 2.56 | 1.41 | 7.74 | 5.71 | 0.6926 | 0.3985 | 0.2941 |
| D.—1st year | 395 | 6,583 | 4,385.39 | 16.67 | 11.10 | 1.78 | 1.64 | 2.19 | 1.26 | 6.87 | 4.23 | 0.6661 | 0.4120 | 0.2541 |
| Total | 1,766 | 33,836 | 22,935.38 | 19.16 | 12.99 | 1.78 | 1.76 | 2.52 | 1.40 | 7.46 | 5.53 | 0.6778 | 0.3895 | 0.2883 |

[a] These bags held a small fraction less than 3 bushels, so the cost of cartage per bushel was a trifle over 7 cents. At present grain bags hold less—about 154 pounds.

Besides these, about 4,942 acres were sown with wheat by colonists who rent the land for three years, paying 71.22 cents per acre per annum. The yield secured by these men was about 18 bushels per acre on the new land and 22 bushels per acre on the second and third year land. The average yield was above the average yield for the whole district.

COST OF SEED AND PREPARATION OF LAND.

The details of the cost of preparation of land and seed in each of the tracts in the table showing the results of farming by the owner are given below:

| | |
|---|---|
| Tract No. 1, 585.63 acres: | |
| Plowing | $0.8547 |
| Twice disk harrowed | .5341 |
| Twice tooth harrowed | .1780 |
| Curing and carting seed | .0356 |
| Drilling | .1246 |
| Seed | .9437 |
| Total cost per acre | 2.6707 |
| Tract No. 2, 398.45 acres: | |
| Plowing in spring | .7122 |
| Plowing and harrowing, autumn | .7122 |
| Disk harrowing | .2670 |
| Twice tooth harrowing | .1780 |
| Bush harrowing | .0890 |
| Curing and carting seed | .0356 |
| Drilling | .1246 |
| Seed | .6410 |
| Total cost per acre | 2.7596 |
| Tract No. 3, 425.01 acres: | |
| Plowing | $0.8547 |
| Twice disk harrowing | .5341 |
| Twice tooth harrowing | .1780 |
| Curing and carting seed | .0356 |
| Drilling | .1246 |
| Seed | .8547 |
| Total cost per acre | 2.5817 |
| Tract No. 4, 494.20 acres: | |
| Plowing | .6410 |
| Twice tooth harrowing | .1780 |
| Sowing with broadcast seeder | .0890 |
| Curing and carting seed | .0356 |
| Seed | .8903 |
| Total cost per acre | 1.8339 |
| Tract No. 5, 847.56 acres, the same as No. 3. | |

EXPLANATORY NOTES.

The following notes, explanatory of these tables, are quoted from Mr. Williams, except that, like all the expressions of quantity and value in the tables, his terms of measurement and value, expressed in metric and Argentine terms, have been converted into United States equivalents. Mr. Williams says:

These prices are based on those paid for plowing by contract, by men who used their own horses and harness and who bought their food, but used plows supplied by the estancia. Practically all the plowing was done in this way, and some of the tooth harrowing and sowing, but all the disk harrowing and most of the other work apart from plowing was done by monthly men using estancia horses. The amount actually paid for labor was not, therefore, so much as represented in the tables, but in this way the necessity for taking into account the cost of horses is avoided.

The cost of cutting, stooking, carting, and stacking is based on the price of $1.78 per acre paid to two men who contracted to do some of the work at this price, providing horses and carts and buying their food. Naturally the actual cost varies enormously with the amount of straw, but this is a good average price to pay a contractor. A sufficiently accurate note of the twine used on the different "chacras" harvested entirely for estancia account was not kept, so that a fixed sum of 21.36

cents per acre has been charged. Thrashing has been charged all through at 9.58 cents per bushel, which was the average price in the district. The price of bags was 9.46 cents each, and as they hold a little more than 80 kilos (a trifle less than 3 bushels), 13.20 cents per 100 kilos (3.674 bushels), allows about the right amount for loss, etc.

With regard to the cost of the preparation of the land by the men working on halves, as they pay for this entirely, and the cost varies considerably if they have a family capable of assisting them or not, the figures given are approximate only. In no case probably would they pay as much money out of pocket, but the use of their horses and harness has to be considered.

What is interesting is to note the difference in the cost of harvesting, and this difference can largely be taken as a gauge of the respective merits of the "medianero," though liable to be modified by the amount of straw they had to handle, by the number of horses and carts which each had, and the greater or fewer number which had to be hired. The figures given are accurate and include the cost of food.

It is hardly necessary to point out that in the foregoing statement no allowance is made for interest on cost of implements, for repairs and depreciation of same, or for rent of land. There are, besides, incidental expenses which vary in individual cases, such as insurance against hail and fire, the use of tarpaulins, etc. In the case of wheat sown by the estancia, the wheat could fairly be relieved of all these charges as a set-off against the fact that the whole cost of plowing and sowing is charged to it, and nothing to the sowing of alfalfa and grass seeds, beyond the cost of the seed.

In the case of an ordinary "chacarero" I think that from $528 to $660 per 247 acres should be a liberal allowance for the necessary capital in items as follows: Plows, $88; harrows, $44; binder, $220; cart, $132; harness, $66; and sundries, $110, and that $220 per annum would be ample to write off this for depreciation and to pay for repairs. The cost of horseflesh is difficult to estimate, as so much depends on the man. It would be quite possible to make money on them while using them, by breaking colts and mares and so considerably enhancing their value. A fair estimate required for 247 acres would be 25 at $17.60, or $440. Leaving these out of the question the depreciation and repairs will amount, as stated, to 89.03 cents per acre; rent, 71.22 cents per acre; and rent for the pasturing of their horses while they can not feed them on their chacras, 17.80 cents per acre, which amounts to a total of $1.78 per acre fixed charges.

The system of shares on which the men work on this estancia is that they supply horses and harness, and the estancia all implements. The expenses of plowing and sowing (food and labor) are for account of the "medianero," while seed wheat, oil, sharpening plow shares, sulphate of copper for curing the seed and breakages caused by fair wear and tear, are on halves. All harvest expenses are also on halves, and the profits are divided equally. It must be noted that the man does not get paid for his own labor during harvest, though he is allowed something for that of his family. It is obvious under these circumstances if he is a good man he can get the work done much cheaper than it can be done on a large scale by the estancia employing day men or letting the work to a contractor who has to make a profit. No rent is charged to the "medianero."

The cost of the commission on sale of the wheat, delivering it, and collection of proceeds in Coronel Suarez was 0.89 of a cent per bushel, but as the usual way is for the "chacarero" to deliver it to a buyer who does not charge for this it is not taken into account.

### COST OF STARTING A SMALL FARM.

In a publication for the information of immigrants, issued in March, 1903, by the Argentine Government, the cost of establishing small farms is given as follows, in United States currency:

*Cost of establishing small farms.*

| Items. | Farm of 247 acres—198 acres cultivated, 49 acres pasture. | | Farm of 124 acres—99 acres cultivated, 25 acres pasture. | | Farm of 62 acres—50 acres cultivated, 12 acres pasture. | |
|---|---|---|---|---|---|---|
| | Number. | Value. | Number. | Value. | Number. | Value. |
| Land, at $6.83 per acre | ..... | $1,687.01 | ..... | $846.92 | ..... | $423.46 |
| Houses, fences, corrals, wells, etc. | ..... | 386.00 | ..... | 270.20 | ..... | 154.40 |
| Oxen, at $15.44 each | 13 | 200.72 | 9 | 138.96 | 4 | 61.76 |
| Horses, at $11.58 | 3 | 34.74 | 2 | 23.16 | 1 | 11.58 |
| Plows, at $11.58 | 3 | 34.74 | 2 | 23.16 | 1 | 11.58 |
| Harrows, at $12.55 | 1 | 12.55 | 1 | 12.55 | 1 | 12.55 |
| Carts, at $86.85 | 1 | 86.85 | 1 | 86.85 | 1 | 86.85 |
| Binders | ..... | 193.00 | ..... | 193.00 | ..... | 193.00 |
| Sundries | ..... | 64.65 | ..... | 48.25 | ..... | 39.57 |
| Cost of living, 1 year | ..... | 289.50 | ..... | 193.00 | ..... | 144.75 |
| Total | ..... | 2,989.76 | ..... | 1,836.05 | ..... | 1,139.50 |
| 14.86 bushels per acre, at $0.656 per bushel | | $1,980.14 | | $965.07 | | $487.41 |
| Less cost of production, at $2.98 per acre | | 590.04 | | 295.02 | | 149.00 |
| Profit | | 1,340.10 | | 670.05 | | 338.41 |

This estimate allows the farmer a profit of $6.77 per acre, after paying for the cost of living for the year and for the cost of production; but the cost of production is estimated very low—too low to be safe.

#### SEÑOR TIDBLOM'S ESTIMATE.

The following detailed estimates of the cost of starting a small wheat farm, of the cost of operating it, and the probable profits to be derived therefrom were made for me by Señor Don Ronaldo Tidblom, Director of Agriculture and Animal Industry in Argentina:

*Capital invested on small farm.*

| | 500 acres—400 cultivated, 100 pasture. | 250 acres—200 cultivated, 50 pasture. | 125 acres—100 cultivated, 25 pasture. |
|---|---|---|---|
| ON PURCHASED LAND. | | | |
| Land at $6.75 per acre | $3,375 | $1,688 | $844 |
| House, fences, corrals, wells | 772 | 482 | 290 |
| Bullocks and horses | 483 | 290 | 193 |
| Plows, harrows, reaper, cart, cleaner, etc | 830 | 560 | 439 |
| Sundries | 521 | 357 | 241 |
| Total | 5,981 | 3,377 | 2,007 |
| ON RENTED LAND. | | | |
| Bullocks and horses | 483 | 290 | 193 |
| Plows, harrows, cart, reaper | 733 | 463 | 343 |
| Sundries | 714 | 502 | 333 |
| Total[a] | 1,930 | 1,255 | 869 |

[a] The rent need not be counted as capital, as it is paid after the crop is gathered.

*Crop, cost of production, and net profit on small farms.*

| Items. | 500 acres—400 cultivated, 100 pasture. | 250 acres—200 cultivated, 50 pasture. | 125 acres—100 cultivated, 25 pasture. |
|---|---|---|---|
| Average crop, 18.37 bushels per acre; value, at 58 cents per bushel, on the farm | $4,261.84 | $2,130.92 | $1,065.46 |
| Average cost of production with family labor: | | | |
| Seed, 57.3 pounds per acre, at $0.7879 per bushel | 300.98 | 150.49 | 75.24 |
| Thrashing, 18.37 bushels per acre, at $0.0919 per bushel | 675.28 | 337.64 | 168.82 |
| Bags, $0.0315 per bushel | 231.46 | 115.73 | 57.87 |
| Hired help for reaping and stacking | 241.25 | 48.25 | ..... |
| Total | 1,448.97 | 652.11 | 301.93 |
| Net average profits | 2,812.87 | 1,478.81 | 763.53 |

This estimate, on the basis of a good yield—18.37 bushels per acre—gives profits per acre as follows: Four hundred acres cultivated, $7.03; 200 acres cultivated, $7.39; 100 acres cultivated, $7.64. The cost of production is: Four hundred acres cultivated, $3.62; 200 acres cultivated, $3.26; 100 acres cultivated, $3.02. The cost of production and the profits vary with the size of the farm, requiring the employment of more labor with the larger farms. This estimate is considered fairly conservative, and is not much under the actual facts where the haul to market is not long and the crop is good. These conditions, however, can not always be had.

### COST OF LABOR.

In December, 1902, the Argentine Department of Agriculture published the following statistics of the price of labor per day on farms in the four principal agricultural Provinces for seeding, harvesting, and thrashing:

*Price of farm labor per day.*

| Provinces. | Seeding. | Harvesting. | Thrashing. |
|---|---|---|---|
| Buenos Aires | $0.54 | $1.42 | $1.4 |
| Santa Fe | .47 | 1.32 | 1.2 |
| Cordoba | .45 | 1.28 | 1.2 |
| Entre Rios | .26 | .78 | .8 |

These prices, all expressed in United States currency, include food and such shelter as the average peon gets on an Argentine farm, which is very inexpensive, to say the least. Food for the peons costs the Argentine farmer about 30 cents United States currency per day per man. These prices are too low for harvest hands, especially in the best wheat regions. It is very common for farmers to pay from $2 to $ per day for men in the height of the harvest season. Men are sometimes hired by the month at this time for $50 to $60 per month and board. Labor is very hard to get and the difficulty of getting help t

gather the grain is one of the greatest obstacles in the way of cereal farming on a large scale. The cities are full of men in various degrees of idleness, uselessness, and poverty who will not go to the country to work. The native "gaucho," or cowboy, prefers to stay in the saddle, and usually does not want to get down to agricultural labor. The industrious Italian, Basque, Russian, or Austrian who is willing to work under the conditions as they exist soon has money enough to start farming on his own account. North American farm hands would never endure these conditions, however, and would probably be disappointed if they went to Argentina to make their fortunes unless they made up their minds in advance to live very much below the scale of the commonest laborer on the poorest North American farm.

## YIELDS AND PRICES.

The yield of wheat per acre in Argentina varies so widely that the average is hardly a fair indication of what the better part of the wheat region is giving. The averages are pulled down by the low yields of regions where wheat growing should not be attempted. The averages given by the Argentine Department of Agriculture for ten years ending with 1901 are as follows, in bushels per acre, for various localities:

| | | | |
|---|---|---|---|
| Santa Fe, north and center | 10.63 | Buenos Aires, north | 14.98 |
| Santa Fe, south | 13.24 | Buenos Aires, center | 17.68 |
| Cordoba, south | 13.01 | Buenos Aires, south | 20.26 |
| Entre Rios | 12.03 | Chubut and Rio Negro[a] | 38.84 |

It is said that a yield of 10 to 12 bushels per acre does not leave the farmer any profit after paying rent and cost of production.[b] Fifteen to 18 bushels per acre is considered a good yield and successful farmers get this. The failures, due to bad farming and unfavorable climatic influences, make a bad showing for the northern Provinces, taken as a whole. Many fields in northern Santa Fe have not given over 4.5 to 5 bushels per acre for several years. The decline of wheat growing in this Province is told in the crop statistics[c] that show in 1901–1902 an average yield of only 4.95 bushels per acre. The writer saw much of this wheat and also of the harvest of 1902–1903, and it was very poor indeed. Fields that were cut with headers would certainly not pay for the labor put upon them and in the United States would not be cut. The grains were miserable, shriveled specimens, fit only for chicken feed. Thousands and thousands of acres in northern Santa Fe have not averaged more than 3 bushels per acre for several years,

[a] Small area, much of it irrigated.

[b] "Estado de las Sementeras de Trigo y Lino en la Provincia de Buenos Aires," by Agronomist Eduardo T. Larguía, of the Argentine department of agriculture, December, 1900.

[c] See p. —, under "Present and Prospective Area."

though the past season seems to have been a trifle better. The southern part of this Province—southern Cordoba and a comparatively small area in southern Entre Rios—give 12 to 18 bushels per acre, and in places more, and did so during most of the time when the struggle to raise wheat in the north was bringing ruin upon those who persistently and blindly stuck to it.

The same year that gave an average of 4.95 bushels to the acre to the Province of Santa Fe gave an average of 15 bushels to the acre for the entire Province of Buenos Aires.[a] Probably 70 to 75 per cent of this was good wheat, most of it of export varieties, fit for foreign markets. Seventy-five "partidos," or counties, in this Province were officially reported, and of these 42 showed maximum yields of from 22.30 to 43.12 bushels per acre, 18 of them 30 bushels to the acre or better. The present year is likely to show equally good or better results, with a largely increased area, though the complete returns are not yet published.

### STATISTICS FOR TEN YEARS.

The following statistics of the production and average prices of wheat in Argentina for ten years were taken from official returns of the Argentine Department of Agriculture:

*Production and prices of wheat, 1892–1901.*

| Year. | Production in bushels. | Average price per bushel. |
|---|---|---|
| 1892 | 39,319,041 | $0.7669 |
| 1893 | 59,109,003 | .6264 |
| 1894 | 81,129,380 | .4793 |
| 1895 | 59,164,115 | .5857 |
| 1896 | 46,737,520 | .7262 |
| 1897 | 31,593,571 | .8562 |
| 1898 | 49,423,458 | .8470 |
| 1899 | 88,066,678 | .5817 |
| 1900 | 99,075,349 | .6316 |
| 1901 | 74,751,923 | .7525 |

The average price of wheat for the same ten years was stated by the same authority in 1902 to have been, in cents per bushel, United States currency—the same valuation used in the statement given above for the provinces—as follows:

| | |
|---|---|
| Chubut | $0.7005 |
| Buenos Aires | .6813 |
| Entre Rios | .6600 |
| Santa Fe | .6450 |
| Cordoba | .6322 |
| Average | .6576 |

[a] La Nacion, Buenos Aires daily, Sept. 18, 1903.

The market prices for wheat in Argentina in September, 1903, were:[a]

*Buenos Aires.*

| | |
|---|---|
| One exceptional lot of Barletta | $0.8413 |
| Especial | .8263 |
| Superior | $0.8024 to .8143 |
| Good | .7664 to .7904 |
| Others | .6467 to .7425 |

At the end of February, 1904, prices in the Buenos Aires market ranged from 80 to 91 cents per bushel.

*Rosario.*

| | |
|---|---|
| Official price for wheat of minimum weight complying with standard requirements of the grain exchange | $0.7485 |
| Other better grades up to | .8134 |

## HARVESTING AND THRASHING.

Harvesting begins in Argentina about the middle of November in the northern wheat regions, is in full motion throughout the entire country during the month of December, and is concluded about the middle to the end of January, the last work being done in the south of Buenos Aires. In ordinary seasons 80 per cent of the crop is harvested during the month of December. The hot winds and sun ripen the wheat very rapidly during November and December, and for this reason especially early sowing is advised.

Probably 80 per cent of the crop is harvested with binders and stacked, much as is done in the United States, except that the stacking is often very badly done, and sometimes the bundles stay in the shock too long before stacking. The difficulty of getting stackers at the right time often causes damage to the grain, or if the farmer tries to do it himself with his family he can not do it fast enough to save the grain, because he has more than he can manage properly. About 15 per cent, it is estimated, is cut with headers (Pl. VI, fig. 1), but the use of these machines is confined almost exclusively to the Province of Santa Fe. Occasionally header stuff is put in sheds, but this is the exception. Usually it is stacked, and very badly stacked, made solid around the edges, and left loose in the middle, so that it settles there and forms a dish to gather water to soak down through the stack. Owing to uneven height of the grain, the headers are set to cut anywhere from 6 to 18 inches of straw. Rank weeds grow in the grain where it is of an inferior quality and poor stand, and these, being cut green with the straw, go into the stack with it. The dampness of the weeds added

[a] The acreage of wheat in the United States in 1902 was 46,202,424 acres, and the average yield 14.5 bushels per acre. The yield in some of the principal wheat States was: Minnesota, 13.9; North Dakota, 15.9; Washington, 22.2; and California, 10.9. The average farm price was 63 cents per bushel; the average Chicago price was 74⅝ cents per bushel, and the average New York price for December was from 76⅛ to 80⅛ cents per bushel.

to the water gathered by the dish at the top of the stack has often caused heavy losses. Farmers who were asked what ruined their wheat, what was wrong with their stacks, replied blankly, "No se" ("I don't know"). Losses also result from shelling when headers are used, so that the Department of Agriculture advises farmers to use binders. The latter are declared to be the most profitable in the end in spite of the added cost of operation. The part of the crop that is thrashed from the shock a few days after cutting and binding is estimated by the Department of Agriculture at 5 per cent.

The chief trouble of the wheat farmer is to get sufficient help during the harvest. Prices of labor at this time are usually high and men are hard to find.[a] There are too many in the cities who will not go to the country to work. Having planted more than he and his family can care for, the poor farmer finds it very difficult to get men to help him save his crop.

### ENGLISH COMPARED WITH AMERICAN THRASHERS.

Thrashing begins shortly after the wheat is stacked and continues until the end of March. American thrashers are fast driving out the English machines. The latter will average about 300 to 350 bags of 154 pounds each per day, and require 32 or 33 men to work. The American machine will turn out 500 or 600 bags per day, and 20 to 22 men can operate it. Steam power is invariably used. The English traction engines have not proved satisfactory as a rule, though the stationary engines are very good and durable. The cost of the separators of both makes is about the same, $1,800 gold. The English stationary engine costs $2,400 and the American $1,800. The English traction engine costs $3,750 and the American traction engine $2,750, all in gold. The chief criticism of the American thrashers is that they are complicated, requiring skilled machinists to keep them going satisfactorily, and that they are not as strong as the English machines and will not stand as much use and abuse. It is said that the English machine is so strong and simple that it can be turned over to the ignorant laborers and they can not break it, and that it will thrash wet, dirty grain better than the American machine. The American machine, they say, is capable of doing much more work, and just as good or better than the English machine when it is properly adjusted, but there are so many things to watch, so many adjustments to make, that the average man who is expected to help run the machine in Argentina does not understand it. He is likely to smash something and be delayed a day or two or more waiting for repairs. "Why don't they make these machines stronger and a little more simple?" is a question often asked. "The manufacturers should understand that the farm hands in this country are not up to the standard of the United States, and

[a] See p. 62, under "Cost of production."

FIG. 1.—UNITED STATES HEADER IN VERY POOR WHEAT IN NORTH SANTA FE.

FIG. 2.—CANADIAN STRIPPER AND THRASHER.

they can't learn to operate complicated machinery that goes wrong when some little screw is turned a trifle too far one way or the other." This is the old, old plea one hears abroad in regard to American goods: "Why don't Americans follow the German trade-winning plan of adapting their wares to the markets they seek to enter?"

Nevertheless, our thrashing outfits are selling in large numbers in Argentina, though many more might be sold. American machines are more popular in the Province of Buenos Aires, where better farming is done, than they are in the Province of Santa Fe, where the Italians predominate to a greater extent and from which wheat culture is departing. The advantage of the traction engine is very great, as without it 20 bullocks, at a cost of $250 a season, must be provided to haul the separator, engine, and "casilla," the little house on wheels in which the boss, generally a machinist,[a] lives.

In the early days of wheat raising in Argentina the grain was thrashed by the simple process of throwing it on the ground and permitting horses to tramp over it. Very little of this is done now, and only in remote parts.

### COST OF THRASHING.

The price for thrashing is usually 80 or 90 cents paper per 100 kilos—that is to say, from 9.58 to 10.77 cents per bushel United States currency. This includes all expenses except bags. Sometimes it is a little more than this, but not often. Straw is used for fuel in the engines, and little other use is made of it. In the Province of Santa Fe straw must be burned within twenty-four hours after thrashing, as it breeds a large fly that is very annoying to cattle.

Thrashing machines pay an annual tax of $110 gold in the Province of Buenos Aires and $45 in the Province of Santa Fe. The outfits are owned by men who go about, much as they do in this country, thrashing for hire. A few of the largest farms and some of the colonies have machines exclusively for their own use.

Wheat is usually hauled from the field where it is thrashed directly to market. Seldom does a farmer have any place to store it, so the bags are piled up in the field to wait till there is time or a cartman can be hired to haul the crop to market. If the farmer has the canvas covers, he covers the wheat, but he does not always have them and the grain is often damaged by rain.

### MACHINERY OTHER THAN THRASHERS.

The machines and implements used by the average farmer are plows, harrows, seeders, and some kind of reaping machine, either a binder, header, or combination machine that strips off the heads and thrashes

[a] Many thrashing outfits are run by machinists from the United States, who make a good year's wages in four months and get home for the next season.

the grain in one operation, and is called a stripper. Many plows are made in Argentina, but the best and those most in use among the better class of farmers come from the United States and England. Single plows cost from $10[a] to $14, gang plows from $45 to $60, and the best riding plows from the United States from $50 to $65. In remote parts, especially in the mountainous regions and in the north, the same kind of plow is being used that was used by the Indians in prehistoric times; that is, a wooden stick, sometimes with an iron point. Most of the harrows used are made in the country and cost from $10 to $12 in one section and from $25 to $35 when made in two sections. Imported English, German, and Swedish three-section harrows cost from $35 to $40. Bush harrows, a large bundle of small trees loaded down with stones or logs, are also sometimes used.

English and American 14-foot broadcast seeders sell for from $50 to $60, and the same made in the country costs from $40 to $55. A good drill of English or American make sells for $90.

The harvesters, binders, and headers used are of American manufacture, with very few exceptions. The English sell a few reapers, but not many. The American twine binder sells for $200 to $230. Headers are used only in the Province of Santa Fe, and they cost from $300 to $350. Their use is decreasing.

Cleaning and classifying machines come from England, Germany, France, and the United States and cost from $120 to $150. These are used only by the best farmers and not always by them. The average farmer wants to sell as much weight as he can, regardless of what it is.

### AGRICULTURAL MACHINERY IMPORTED INTO ARGENTINA.

The following table shows the amount and kinds of farm machinery exported to Argentina by the United States for the past thirteen fiscal years:

*Agricultural machinery and implements exported from the United States to Argentina, 1891 to 1903.*

| Years ended June 30— | Mowers and reapers, and parts. | Plows and cultivators, and parts. | All other, and parts. | Total. |
|---|---|---|---|---|
| 1891 | $75,546 | $66,945 | $57,557 | $200,048 |
| Average 1894–1898 | 600,874 | 119,333 | 112,826 | 833,033 |
| 1899 | 1,074,749 | 440,996 | 163,274 | 1,679,019 |
| 1900 | 1,194,961 | 388,903 | 221,880 | 1,805,744 |
| 1901 | 805,703 | 369,522 | 245,353 | 1,420,578 |
| 1902 | 689,509 | 621,802 | 628,511 | 1,939,822 |
| 1903 | 635,549 | 1,003,880 | 1,181,828 | 2,821,257 |

[a] All the prices given here for machinery are in United States currency.

The reports of the Argentine National Bureau of Statistics show that during the two calendar years 1901 and 1902 Argentina has imported agricultural machinery and implements as follows:

*Imports of agricultural machinery and implements into Argentina for the calendar years 1901 and 1902.* [a]

| Classes. | Duty. | 1902. | | 1901. | |
|---|---|---|---|---|---|
| | | Quantity.[b] | Value. | Quantity.[b] | Value. |
| Plows | $1.322 | 45,289 | $711,724 | 34,468 | $651,660 |
| Cornshellers | Free and $2.137 | 1,884 | 66,466 | 1,442 | 60,445 |
| Headers | Free | 1,061 | 163,665 | 1,776 | 245,035 |
| Scythes, sickles, etc ....pounds | $0.110 | 53,512 | 7,359 | 88,697 | 13,275 |
| Harrows | Free and $0.80 | 3,156 | 25,248 | ..... | ..... |
| Horserakes | Free and $1.93 | 1,274 | 26,626 | 1,583 | 36,409 |
| Other rakes....pounds | $0.072 | 19,515 | 1,769 | 29,550 | 2,680 |
| Plowshares ....do | $0.023 | 570,965 | 71,207 | 645,372 | 79,394 |
| Binders | Free | 3,301 | 352,895 | 1,433 | 178,845 |
| Mowers | Free | 4,792 | 284,323 | 4,449 | 294,334 |
| Seeders | Free and $2.357 | 3,269 | 83,071 | 2,857 | 78,232 |
| Thrashing machines and engines | Free | 64 | 155,125 | 201 | 395,640 |
| Thrashing machines without engines | Free | 103 | 112,730 | 83 | 139,715 |
| Spades, shovels, hoes, etc .pounds | Free and $0.067 | 1,284,453 | 105,783 | 1,924,488 | 152,746 |
| Other agricultural machines and implements....bundles | 31.2 per cent | 3,147 | 63,653 | 1,828 | 108,501 |
| Total | $141,809 | ..... | 2,231,644 | ..... | 2,436,911 |

[a] The valuations in this table are in Argentine gold, worth $0.965 on the dollar in United States currency.
[b] Number of articles, unless otherwise specified.

The reports of the Bureau of Statistics, United States Department of Commerce and Labor, show that during the calendar year 1902 the United States exported to Argentina agricultural implements and machinery to the value of $2,381,735, or $248,199 more than the entire amount of the imports of Argentina, as stated by the Argentine statistics. This discrepancy may be accounted for by a difference of classification and valuation, and by the fact that heavy exports from the United States at the end of 1902 had not arrived in Argentina to be included in that year's imports.

## THE USE OF "STRIPPERS."

During the harvest season of 1902–1903 in Argentina a fairly successful effort was made to introduce the combined harvester and thrasher, commonly known as the "stripper" (Pl. VI, fig. 2, and Pl. VII). These machines have been in general use in Australia for many years, being especially adapted to the dry harvest seasons of that country.

### DESCRIPTION OF THE PROCESS.

The heads are stripped from the stalks, standing in the field, by a comb having the appearance of a sickle guard, and taking a 5-foot swath. The straw is thus left standing where it grew. The process of stripping is aided by a beater, working in a drum about 18 inches in diameter directly above the rear of the comb. This beater revolves

at a tremendous rate and furnishes the draft which carries the heads up into the cylinder. One machine has an apron to elevate the heads, but this is not necessary, as the machines without it work equally well and have that much less machinery to propel. The cylinder is a very simple affair, merely teeth revolving within stationary teeth. In one machine the revolving teeth are set in a spiral form, and are about one-fourth of an inch thick, long, broad at the base, and coming to a point at the top. In the other machines the teeth are simply four rows of square iron bars, 5 or 6 inches long, set on the cylinder diamond-shaped, the rows at right angles with each other. These revolve between stationary teeth exactly like themselves. The process is described as a rubbing rather than a battering of the heads, which does not break the grains. After passing through the cylinder the grain, straw, chaff, and everything fall on a vibrating metal table, whence it all flows steadily to the sieves. Imperfectly thrashed grains are carried by a belt-and-cup elevator to the cylinder again and again until the grain is taken out and the chaff blown away by the fan blast. The winnower and its fan are both adjustable by levers from the driver's seat. The driver may give more or less shake, alter the angle of the sieves, the speed of the fan, etc., to suit the peculiarities of the grain, the speed of the team, the prevailing wind, the nature of the land over which the machine is passing, or the angle at which the stripper is being worked. The stripper comb is also easily lowered or raised by the driver from his seat. After being cleaned by the winnower the grain is picked up by a little belt-and-cup elevator and carried to the top of the machine, where it is screened by passing over a cylindrical steel-slotted screen, which takes out the weed seeds and other foreign matter and small grains, which are deposited in a bin by themselves. The perfect grain is poured into a bin, from which it is bagged.

### DIFFERENCES IN MACHINES.

At this point one of the machines (Pl. VII, fig. 1) differs from the others in that it bags the grain as the machine moves. Four bags are hung on spouts, through which the grain pours into the bags from a small receiving box. The driver controls this operation also and may throw the bags off by a lever when they are full. This contrivance is of very doubtful utility, since the driver must watch the bags constantly to see when they are filled and must in fact stop and take off the full bag, fasten it up, and either put on a new one or wait until he arrives at a corner, or station, and wait for it to be put on. All this takes time and it leaves the filled bags scattered all over the field. Other machines carry a receiving box large enough to hold four or five bagfuls. The spout at the bottom is large and the bin is quickly emptied into bags and taken by the cartmen at a station, a fixed place for stopping at each round. While this is being done the machine is

FIG. 1.—AUSTRALIAN STRIPPER WITH AUTOMATIC BAGGER.

FIG. 2.—AUSTRALIAN STRIPPER OF PEARSON'S FARM, PROVINCE OF BUENOS AIRES.

oiled, the team rests a moment, and little or no time is lost. Besides, the bags are then deposited in one place.

One of these machines, the one with automatic bagging device, discharges its straw and chaff under the middle of the machine, whence it is blown through the machine and all over the driver. The other machines shown in Argentina discharge the straw at the rear of the machine. It was claimed by the advocates of the first machine that in discharging chaff at the rear, with the sieves open at that end, much grain was blown out by the natural draft produced by the movement of the machine. This was denied by the farmers using the machine that discharges at the rear.

### SOME OF THE DIFFICULTIES.

These combination machines must have perfect conditions to work well. The grain must be dry and ripe, free from weeds, especially thistles, and should be of uniform height and weight to give the best results. If the grain is unripe or damp it will not thrash clean, the machine will clog, and the wheat will be injured by being bagged damp. Yet I have seen these machines doing excellent work in a field of good, ripe Russian wheat early in the afternoon of a day following a rainy night. The grain was very ripe and was uniform. Green weeds will hopelessly clog the machine, both in the stripping comb and in other parts, and they must be pulled up ahead of the machine. Thistles will stop it at once. If the straw is of uneven length, so that it becomes necessary to lower the comb to take in the lower heads, so much straw will be taken in from the long stalks that clogging is likely to occur. It is claimed that lodged grain can be gathered by the strippers, and one of them is fitted with a false comb that reaches down for this purpose. In Australia care is taken to raise wheat that will stand up well and hold its grains a long time in the head. Wheat that shells easily is not suited to these machines because it will be whipped out by the wind before the entire crop can be harvested, and the machine itself will lose some.

### SOME ADVANTAGES.

The savings made by farmers using these combination machines are very great in seasons adapted to their use. The actual cost of harvesting and thrashing is estimated to be from one-fifth to one-half as much with the combined stripper and thrasher as with binders and thrashing machines. Besides, farmers are relieved of the worry and chance of loss from inability to get help or machines when needed. The whole operation is done much more quickly and the grain is ready for market at once if desired.[1] One man easily runs the machine with a boy to ride the lead horse. From four to seven horses are used to draw the machine, and they do not find it hard work. The ordinary peons, it is

claimed, learn the machine easily, and have little trouble with it if the grain is in the right condition. However, during the harvest of 1903–1904, when more machines had been introduced, there were reports of delays because the peons did not learn how to handle the machines. Many machines were returned to dealers because it was claimed they would not work. The cost of repairs is small, and it is said the machines are good for eight years' wear if well cared for. From 6 to 10 acres a day may be cut with each machine.

### COST COMPARED WITH BINDING AND THRASHING.

Through the courtesy of Mr. J. Charles Pearson, a wheat farmer, who stripped 1,483 acres with six of these machines, an exact account of the results and cost of their operation as compared with the use of binders and thrashing machines that had previously been used on the place can be given. This farm is located 33 miles from Coronel Suarez, in the Province of Buenos Aires. The machines had never been used there before, so the men had to learn how to work them. The six machines stripped the 1,483 acres in 30 days, excluding six wet days. This is an average of 6.86 acres per machine per day for the entire time of 36 days, or 8.23 acres per machine per day for the dry days. The average for the time actually worked was 7.41 acres per machine per day. The yield was a trifle less than 16 bushels to the acre of wheat, a total of 23,919 bushels. The average amount of wheat harvested was 192 to 206 bushels per machine per day. Besides, 1,957 bushels of oats were harvested in the same manner. It was estimated that there was a loss of 1.5 bushels to the acre, or over 2,200 bushels, that would have been saved by binders, because a kind of wheat unsuitable to the strippers had been sown. It was Russian and shelled out too easily. Barletta will be used hereafter.

The actual cost and receipts of the harvest, as stated by Mr. Pearson, were:

| | |
|---|---|
| *Expenses.* | |
| 12 men, 6 machines, thirty days, at $20.02, or $1.66 per day per man | $600.60 |
| 2 men sewing bags, thirty days, at $3.08, or $1.54 per man per day | 92.40 |
| Rations of 20 men, thirty days | 188.76 |
| Total | 881.76 |
| *Receipts.* | |
| 23,920 bushels wheat, at 55.08 cents per bushel[a] | 13,175.14 |
| 2,269 bushels oats, at 25.54 cents per bushel | 579.50 |
| Total | 13,754.64 |
| Less expenses | 881.76 |
| Net proceeds | 12,872.88 |

[a] The prices of wheat in this statement represent farm values, not the price in the market, 33 miles distant.

Mr. Pearson estimates, from several past seasons' records, that the expenses and results of harvesting the same grain with binders and thrashing it with thrashing machines, would have been as follows:

*Expenses.*

| | |
|---|---|
| Cutting and binding, 6 machines, 12 men, twenty days, at $18.48, or $1.54 per man per day | $369.60 |
| Shocking and stacking | 826.32 |
| Thrashing 27,335 bushels, at 9.58 cents per bushel | 2,618.69 |
| Binding twine, 75 bales of 12 balls each, allowing 1 bale to 20 acres, at $7.36 per bale | 552.00 |
| Receiving at thrasher, twenty days, at $1.32 | 26.40 |
| Carts borrowed | 44.00 |
| Carting, 8 men, fourteen days, at $1.54 | 172.48 |
| Rations of 30 men, thirty days, at 31 cents per man per day | 279.00 |
| Total | 4,888.49 |

*Receipts.*

| | |
|---|---|
| 27,335 bushels of wheat, at 55.08 cents per bushel | 15,056.12 |
| Less expenses | 4,888.49 |
| Net proceeds | 10,167.63 |

This is the statement as it was sent to the writer after the harvest by Mr. Pearson, the terms converted into United States currency and measurements. Expenses common to both methods, such as horse hire, bags, etc., are not charged in either account. The rations paid for are for more men than are accounted for in the statement of wages paid, but this is supposed to cover the regular farm hands, whose wages are not included in the statement in either case, but their rations are. Under the stripper expenses no charge is made for carting, which should have been done, as it has been charged against the binder and thrasher method and it applies to the stripper method as well. The cost would be not far from $270. It will be noticed that the crop is estimated to have been greater with binders than with the strippers. This is the estimate of what would have been saved by the binders if the entire area had been sown to wheat, leaving out the calculation of oats. With any kind of wheat except Barletta the strippers lose a little when the grain is ripe. The fact that Mr. Pearson is a very enthusiastic admirer of the new method must also be borne in mind in considering these estimates, which favor the stripper. He was highly pleased with the work done on his place and will extend his use of the machines.

"The strippers can be relied upon to do their work well in any average season in this country," says Mr. Pearson. "They are much less likely to get out of order than reapers and binders. The strippers do away with very indifferent stooking and stacking, which is

quite general in this country. The expenses of twine and costly thrashing are saved, and we avoid the liability of the wheat when cut to be always at the mercy of the elements."

A COMMERCIAL JOURNAL'S ESTIMATE.

A correspondent of the Review of the River Plate, a weekly English commercial paper published in Buenos Aires, compares the expenses of the two methods in the Province of Buenos Aires as follows:

The conditions are presumed to be:

1. That the crop is 14.87 bushels per acre.
2. That the cost of implements, twine, etc., is the same as during 1902–1903.
3. That the pasturage for horses is free.
4. That five machines are in use.
5. That in the case of the harvester [a] the area of crop stripped daily is 49.42 acres, or 9.88 acres per machine.
6. That the number of peons employed is 16, or 5 for managing horses, 5 for the machines, 5 for sewing up bags, piling, bringing out fresh teams, and doing whatever may be necessary to expedite the work, and 1 cook.

With the harvester method the expenses per acre are approximately as follows:

| | |
|---|---|
| Labor and maintenance of peons, stripping the crop, sewing and piling the bags | $0.5908 |
| Cost of bags and oil | .5341 |
| Total | 1.1249 |

With the binder the usual total expenses are:

| | |
|---|---|
| Labor and maintenance of peons, cutting, carting, and stacking | $1.7806 |
| Bags, twine, and oil | .8012 |
| Thrashing | 1.3354 |
| Total | 3.9172 |

The difference, of course, is a very great one in favor of the harvester. In fact, it will be noticed that the whole cost of harvesting with these machines is less than the cost of thrashing stacked wheat after all the expenses of cutting, carting, and stacking have been incurred.

It is claimed by the makers that the life of the combined harvester, with ordinary care, is at least eight years, and assuming this to be the case, when interest on capital and depreciation on the machinery are taken into account, the cost of the harvester method will be raised to $1.5723 per acre and that of the binder to $4.1952 per acre.

Thus the binder system of harvesting a wheat crop is something like 250 per cent more expensive than with the harvester, a statement which, however startling, is nevertheless perfectly true.

And, apart from the direct gain in actual cash, a great advantage possessed by the harvester is that it enables the wheat grower to secure his grain against damage by weather at the finish of each day's work, while by other methods the stacks are running the risk of such damage until a thrashing machine can be obtained.

In short, the use of the harvester reduces the cost of producing wheat to such a low figure that it would seem impossible for the price of wheat ever to go that low.

[a] "Harvester" is the term used by the English and Australians to designate this machine, the combined stripper and thrasher, distinguishing it from the machine in use in Australia, which merely strips the heads off and does not thrash the grain.

The following table will show the cost of production of wheat under the two methods, leaving out the item of rent:

*Comparison of expenses in harvesting.*

| Items. | Harvester. | | Binder. | |
|---|---|---|---|---|
| | Cost per acre. | Cost per bushel. | Cost per acre. | Cost per bushel. |
| Interest on capital, depreciation on live stock and machinery | $0.8796 | $0.0591 | $0.5074 | $0.0341 |
| Seed and dressing | .7122 | .0479 | .7122 | .0479 |
| Labor and maintenance of peons | 1.6595 | .1116 | 2.8490 | .1916 |
| Bags, oil, twine, and thrashing | .5341 | .0359 | 2.1327 | .1437 |
| Hail insurance | .1780 | .0119 | .1780 | .0119 |
| Total | 3.9634 | .2664 | 6.3793 | .4292 |

Twine and thrashing, of course, only apply in the case of the binder.

DIFFERENT STYLES OF "STRIPPERS."

Three different styles of these machines were tried in Argentina during the harvest of 1902–1903. Two of them came from Australia, and have been described. They were made of wood to the greatest possible extent. The draft claimed is 383 to 448 pounds. The third machine was made in Canada. (Pl. VI, fig. 2.) Steel and iron were used in its construction in place of wood wherever possible. It was a lighter machine than the original Australian type and did equally good work, though its sale was not pushed and only three or four were sold. About 40 of the Australian machines were disposed of and more might have been placed. The price of the machines during this first season was $750 gold, but for the following season it was somewhat reduced. The price is altogether too high, and manufacturers in the United States will soon be in the market with these machines at probably half this price.[a]

PROBABLE FUTURE USE.

The strippers will probably not drive out the binders, though a large number were sold during 1903 on the strength of the previous season's successful trials. In regions and seasons that are dry they will prove a most valuable auxiliary machine, but beyond this they may not be relied upon. Farmers will not be able to discard their binders and depend exclusively upon strippers, though one farmer in the southern part of the Province of Buenos Aires bought 50 strippers for the season of 1903–1904.

[a] An American company built several machines of this type during the year 1903, but the atmospheric conditions in California and Washington, where they were tried, did not seem to be suited to them during the last harvest season. The machines were shipped to Australia and Argentina, where they have been tried, but the results have not been made public.

### HISTORY OF THE "STRIPPERS."

The combined stripper and thrasher is an Australian invention. Some time in the seventies a prize of $20,000 was offered by the South Australian government for a machine that would strip, clean, and bag the grain at one operation. The first attempts were unsuccessful, and it was not until 1883 that a prize was offered by the Victorian government, which resulted in a trial at Dookie, on the Government experimental farm, December 21, 1883. Two machines entered this trial, though four had been made to compete for the prize. The machine invented by James Morrow (Pl. VII, fig. 2) won this contest. The work done is said to have been as good as any by the later improved machines. This first machine had a mower attached under the stripper, which cut the straw after the heads had been pulled off and left it lying in the field. This is not done now. The straw is left standing. This machine was drawn by three horses and harvested an acre in a little more than an hour, and it was claimed that it would harvest an acre an hour all day. Two years later another machine appeared and soon demonstrated its right to at least second place. Many trials were made and have been made almost every year since, the chief rivalry being between these two machines, which are now contesting for the trade in Argentina. The first machine is the one which discharges its chaff at the rear of the machine and deposits the grain in a large box, to be drawn off in bags when the machine stops. At first the plan was to carry the chaff and drop it in any desired place, but this was abandoned. The other machine bags the grain and discharges its chaff, as it were, "amidships." The Canadian machine is modeled more after the first.

## MARKETING WHEAT.

The Argentine wheat farmer loses an amount equal to a good profit through the lack of proper facilities and improved methods in getting his product to market after it is thrashed. The cost of bags, bad roads, absence of warehouses or elevators, shortage of railway cars, local taxes on production, high freight rates, and inadequate facilities in the shipping ports pile up charges that reduce the price paid to the farmer for his wheat.

### BAD ROADS.

The wheat country is nearly perfectly flat, with scarcely a knoll or depression. The roads are very wide to permit driving cattle and are almost wholly neglected. Animals and heavily-loaded wagons go wandering, floundering in all parts of the road. The marketing season, from January to May, is most likely to be wet. Progress over these great mud roads is therefore slow and expensive.

## HAULING.

Wheat is hauled to market usually in immense two or four wheeled wagons. (Pl. VIII, figs. 1 and 2.) The two-wheelers have wheels 8 feet in diameter and the tires are 4 inches or more wide. One little horse or mule is fastened between a pair of huge thills and a dozen or fifteen others are hooked on in various ways, with ropes tied to the axle, to the thills, to the frame of the cart, to the hubs of all the wheels, or any place to which a rope can be made fast. Sometimes the cart gets out of balance and lifts the little horse up in the air. Many cartmen use oxen, from 8 to 16 bullocks to a cart, fastened with ropes leading from a yoke tied fast to the horns; so the draft is on the animals' necks. This is the system in use everywhere in Argentina for working oxen. Often the driver sits on the yoke between the heads of two oxen.

The four-wheeled carts have front wheels about half the diameter of the rear wheels, which are usually not quite as high as the two-wheelers, and carry heavier loads, requiring more horses or oxen. These great carts carry from 4 to 6 tons, and I have heard of occasional much larger loads. The men carry the bags up into them on ladders. The bags now weigh 70 kilos (154 pounds), and the cartmen carry about 80 of them, though sometimes more. Usually this work is done by men who make a business of it, not by the wheat growers themselves, unless they are near to the station. Some farmers, however, own their own carts. Wheat is hauled in this way from 15 to 60 miles to the nearest railway station. The prices for hauling vary from 20 to 30 cents per bag, or 7.8 to 11.7 cents per bushel, for distances above 20 miles. At a place 33 miles from the station the cartmen were receiving 26.4 cents per bag. They would start on Saturday and return the following Thursday, generally going in parties of three or more carts, camping at night, sleeping under the wagons and turning the horses loose to graze. The horses are not fed grain and all over the country are shamefully abused. The idea seems to be that fresh horses are cheaper than feed. After getting started, one man drives and manages each cart and all its horses. Usually extra horses are led behind to rest the others, and they are moving during all the hours of daylight. The capital invested in the cartman's outfit is: Cart, $270 to $450; harness, $65; 30 horses, $200, or 16 oxen, $212.

Colonists living close to the railway either haul their own grain to market in smaller carts or get it hauled cheaper. The average cost is estimated to be, for the farmers living within an average of 6 miles from the station, 4.2 cents per bushel, but they make it up by paying higher rents.

### BAGS.

All grain is marketed in coarse jute bags, which cost about 10 cents each, or at the rate of 3.87 cents per bushel, or 58 cents per acre on a yield of 15 bushels to the acre. The average farmer has about 200 acres, so his bags will cost him at least $116 gold per year. Sometimes the price of bags goes higher, and it has resulted in bulk shipments on board ship, the bags being cut open and resold to the farmers at a reduced price. All the material for making bags is imported, and the industry of sewing the pieces of sacking together (for they are imported cut, ready to sew) is protected by a duty. Otherwise the bags would be much cheaper. The bags are not always of a good quality and losses are sustained by leakage.

### EXPENSES IN THE STATION.

Grain pays different taxes on production in different provinces, and sometimes more in one part of a province than in another. In the Province of Buenos Aires the tax on production is 9 cents paper per 100 kilos, or 1.1 cents United States currency per bushel, which is a Provincial tax, collected when the grain is sold. In the Province of Santa Fe the tax is 8 cents paper per 100 kilos, or a trifle less than 1 cent per bushel United States currency. Sometimes this tax is avoided, or partly avoided. It was formerly collected as a tax on the moving of produce, cattle, etc., called the "guia de campaña," but the supreme court held that to be unconstitutional. Then the "derecha de producción," tax on production, was substituted and is now being generally collected in the Provinces of Buenos Aires and Santa Fe. It is not imposed in Cordoba and Entre Rios.

The labor of peons in unloading the wagons and loading the cars costs 7 cents paper per 100 kilos, or 0.8 cent United States currency per bushel, though the farmer often avoids this charge by doing the work himself. The men get 3 to 5 cents paper per bag for handling the grain in piles. No conveniences for loading or unloading are provided in the country stations. (Pl. VIII, fig. 2.) Every sack must be handled by men every time it is moved. It is very seldom that grain can be loaded into the railway cars directly from the carts that haul it from the "chacra," or farm. In some of the principal wheat stations corrugated iron warehouses have been built for the storage of grain, but these are principally for the use of wheat buyers or owners of large tracts of rented land. Wheat is stored in them to be held for a better price or to await the supply of cars. Very few warehouses are available for the use of the small farmer, and if such warehouses were provided not one farmer in a thousand would pay the smallest fee to store his grain in them. These ignorant men prefer to pile their produce outdoors exposed to the weather. Sometimes it is covered with

FIG. 1.—HAULING WHEAT TO MARKET, PROVINCE OF BUENOS AIRES.

FIG. 2.—UNLOADING WHEAT CARTS, CORONEL SUAREZ.

a canvas, but not often on the farm and not always in the station. Even after it has passed into the possession of the buyer it is often left uncovered.

Where storage is provided, the charge is 5 cents paper per 100 kilos per month, or 0.6 cent United States currency per bushel, and at least one month's rent must be paid in advance.

The unwillingness of the Italian farmer to let go of money, once he has it, was well illustrated by the experience of the owner of a large tract of land rented to wheat farmers in the Province of Santa Fe. Thinking to help his tenants, he built a large brick warehouse on his property, through which the railway ran, and arranged with the railway company to give him and his tenants cars at this warehouse, which was built so the floor was on a level with the floor of the cars on the track alongside. To begin educating his men to spend a little money to save their produce, he offered to store their wheat at the rate of 1 cent paper per 100 kilos per month. This would be less than 4 cents United States currency per ton per month. Yet only one of all his colonists took advantage of this offer, and he put in the warehouse some of the poorest of his grain, not wishing to take the chances on letting his good grain out of his sight. He sold his poor grain for more than he was able to get for his best wheat left out exposed to the rain. Only a few were convinced by the higher prices obtained by the "patron" (proprietor) for his share of the crop stored in the warehouse.

### FREE STORAGE IN STATIONS.

A law of the Argentine Congress, promulgated September 17, 1903, requires all railway stations in the agricultural region to be provided by the railway companies with free storage of all cereals offered for shipment. The Ministry of Public Works is to determine what stations must be so provided and what the capacity of the sheds shall be.

Every railway company that does not comply with this law within eight months of its promulgation is liable to a fine of $1,000 to $5,000 (Argentine paper) for each station without a shed, according to the importance of the station. The railway companies must begin the construction within a month, under the same penalty for failure, and also be liable for all damages to grain owing to lack of shelter. This will greatly stimulate the railway companies to move the grain as fast as possible. At least one of the railways is considering the establishment of a system of station elevators, but this law providing free storage pending shipment may interfere with that. The Government has just granted a concession to the firm that operates the big Belgian mill and elevator in Buenos Aires to construct and operate grain elevators in all country stations which are considered agricultural centers and in the river and Atlantic ports, with the exception of Buenos

Aires. Elevators are sure to be built as soon as the grain area is a little more settled, so they will have business every year. Some rather unsatisfactory experiments were made eight or ten years ago with small elevators in the country. The grain fields were turned into pastures and the elevators were empty.

### LACK OF WAREHOUSES AND CARS.

Generally wheat is stacked in great piles of bags (Pl. IX, figs. 1 and 2) in the country stations waiting shipment. It is almost invariably sold to some regular buyer for cash on arrival in the station, or before, and the responsibility for its care is thereafter with the buyer. These buyers often classify and repile wheat (Pl. IX, fig. 2) before sending it on to the seaport, and they usually have immense heavy canvas covers to put over the piles. (Pl. IX, fig. 1.) The piles are built on platforms 6 inches from the ground, and if well covered suffer little or no damage. Indeed, the writer was repeatedly told that even if not covered the losses were not enough to pay for the cost of building warehouses or operating elevators. But this is not the universal judgment. There is a strong demand for some system of warehouses or elevators and for handling in bulk.

At the end of February, 1903, there were on deposit and in piles in the country station yards of the Great Southern Railway in the Province of Buenos Aires 1,501,507 bags of wheat. The number of bags received was each week increasing far beyond the capacity of the railway to handle them. The number of bags loaded into cars per week during the month on the whole system of about 1,500 miles in the wheat region was: First week, 269,957; second week, 321,068; third week, 319,401; fourth week, 236,885.

During the last week two working days were lost for the annual carnival season, when all business is suspended.

Bags often lie in the yards two months or more waiting for cars. At this time grain merchants and railway-traffic managers are in a state of feverish excitement. The grain men are trying to outwit each other and the traffic managers to get their grain to market, for the supply of cars is evidently quite insufficient under the present system. The newspapers are full of complaints, and the grain men hold meetings to voice their impotent wrath. Appeals are made to the Government. The railways do the best they can and are building more cars, but with so many cars tied up in the ports and the business increasing they can not keep up. One company has just ordered 1,000 40-ton cars.

The system of handling grain in bags is a heavy charge upon all kinds of grain from the time it leaves the thrashing machine until it reaches the consumer. The lack of elevators makes it necessary. The bags must be repeatedly handled by men at great expense of time and money.

FIG. 1.—WHEAT PILES, CORONEL SUAREZ, SOUTHERN RAILWAY, PROVINCE OF BUENOS AIRES.

FIG. 2.—TRANSFERRING AND WEIGHING WHEAT PILES, CORONEL SUAREZ.

### SMALL UNCOVERED CARS.

Grain is often shipped in open flat cars, usually covered with canvas, and it sometimes gets wet en route or while waiting to be unloaded at the seaport. Box cars have sliding doors on top, so that they may be unloaded out of the top by steam winches that lift eight or ten bags out and drop them into the ship's hold. This can not always be done. The great majority of the cars are small, only 10 to 18 tons, though the cars now built are larger, generally 30 to 36 tons. The Southern, Central Argentine, and Buenos Aires and Rosario railways are all putting on the large cars. The little old English cars are still greatly in the majority, however, as the railways are all English.

About two years ago Mr. Robert Gould, superintendent of the car and locomotive works of the Southern Railway, was sent by his company to the United States to study the new ideas and improvements of our railway systems. He was greatly impressed with the American elevator system, seeing the immense saving to the railway, the farmer, and the shipper under this economical method of handling grain, and the results of his influence are appearing in the form of elevators and larger cars.

### RAILWAY FREIGHTS.

The freight rates on wheat on Argentine railways, which almost exclusively transport it to the seaports, are as follows, in cents per bushel, United States currency:

*Freight rates between principal points.*

| Route. | Miles. | Cents per bushel. |
|---|---|---|
| *Province of Buenos Aires.* | | |
| From Mar del Plata to Buenos Aires | 248 | 8.38 |
| From Dolores to Buenos Aires | 127 | 6.30 |
| From Necochea to Buenos Aires | 327 | 9.40 |
| From Tandil to Buenos Aires | 205 | 7.73 |
| From Tandil to Bahia Blanca | 232 | 8.14 |
| From Azul to Bahia Blanca | 244 | 8.31 |
| From Azul to Buenos Aires | 179 | 7.31 |
| From Bolivar to Buenos Aires | 206 | 7.73 |
| From Bolivar to Bahia Blanca | 253 | 8.46 |
| From Pehuajo to Buenos Aires | 225 | 8.02 |
| From Drysdale to Buenos Aires | 307 | 9.13 |
| From Bragado to Buenos Aires | 130 | 6.38 |
| From General Villegas to Buenos Aires | 285 | 8.86 |
| From Junin to Buenos Aires | 155 | 7.00 |
| From Junin to Rosario | 132 | 6.01 |
| From Pergamino to Buenos Aires | 143 | 7.06 |
| From Pergamino to Rosario | 76 | 7.05 |
| From Arrecifes to Rosario | 106 | 8.10 |
| From Arrecifes to Buenos Aires | 113 | 6.31 |
| From Baradero to Buenos Aires | 92 | 5.09 |
| From Baradero to Rosario | 96 | 5.80 |
| *Province of Santa Fe.* | | |
| From Rufino to Rosario | 185 | 7.66 |
| From Rufino to Buenos Aires | 259 | 10.77 |
| From Venado Tuerto to Rosario | 128 | 7.06 |
| From Morteros to Santa Fe | 175 | 8.69 |
| From Morteros to Rosario | 190 | 8.38 |
| From San Francisco to Rosario | 139 | 6.73 |
| From San Francisco to Santa Fe | 124 | 5.94 |

*Freight rates between principal points*—Continued.

| Route. | Miles. | Cents per bushel. |
|---|---|---|
| *Province of Santa Fe*—Continued. | | |
| From Rafaela to Santa Fe | 114 | 5.53 |
| From Rafaela to Rosario | 129 | 6.40 |
| From Ceres to Rosario | 229 | 9.30 |
| From Ceres to Santa Fe | 214 | 11.36 |
| From Vera to Santa Fe | 156 | 9.16 |
| *Province of Cordoba.* | | |
| From Villa Maria to Rosario | 157 | 9.71 |
| From Cordoba to Rosario | 247 | 11.77 |
| From Cordoba to Santa Fe | 357 | 13.48 |
| From Rio Cuarto to Rosario | 277 | 9.46 |
| *Province of Entre Rios.* | | |
| From Tala to Concepcion del Uruguay | 118 | 5.12 |
| From Tala to Parana | 122 | 7.72 |
| From Tala to Puerto Ruiz | 73 | 5.97 |
| From Tala to Victoria | 72 | 5.83 |

The average Argentine freight rate in 1901 was 1.6 cents per ton per mile according to official statistics. The report of the Interstate Commerce Commission for that year shows the average rate in the United States to have been three-quarters of one cent per ton per mile.

According to the New York Produce Exchange, the freight rates on wheat in 1902 from Chicago to New York averaged in cents per bushel:

| | |
|---|---|
| By lake and canal | 5.25 |
| By lake and rail | 5.78 |
| By all rail for domestic consumption | 10.60 |
| By all rail for export | 8.75 |

The Merchants' Exchange of St. Louis gives these average rates for wheat from St. Louis during the year 1902:

To New Orleans by river, in 100-pound sacks, 10 cents per sack; to New Orleans by river in barges, in bulk, 4.20 cents per bushel; to New York by rail, 20.66 cents per 100 pounds; to Liverpool, via New Orleans, 8.53 cents per bushel; to Liverpool, via New York, 15.33 cents per bushel.

On the authority of the Chicago Board of Trade, the average freight rates on grain through from Chicago to the seaboard by rail and thence by steamers to European ports were as follows, in cents per 100 pounds:

| | |
|---|---|
| To Liverpool | 20.85 |
| To Glasgow | 21.75 |
| To London | 21.75 |

### HANDLING AT THE SEAPORT.

The wasteful methods observed on the farm and in the country station continue in the handling of grain at the seaport. Wheat is exported from Rosario, Buenos Aires, La Plata, Bahia Blanca, and several small ports on the Parana River between Buenos Aires and

Santa Fe. About nine-tenths goes from Rosario, Buenos Aires, and Bahia Blanca. The latter is fast increasing in importance, as it is now the only ocean seaport of Argentina that is provided with any equipment for shipping, and wheat growing is going in that direction. All the others are river ports, even that of Buenos Aires, and subject to vexing uncertainty of depth. The tremendous amount of silt brought down by the Parana makes constant dredging necessary. Another great port will some day be made at Samborombon on the Atlantic coast about 100 miles below the city of Buenos Aires.

### GROWTH OF SHIPPING FACILITIES.

The facilities for exporting grain are wholly inadequate. Ships are kept waiting for days and in the port of Buenos Aires are often berthed three deep, so the bags of wheat, corn, linseed, or whatever the cargo may be, have to be carried one at a time by men from the railway cars on the track alongside, across two ships into the hold of another. Sailing vessels must always make room for steamers. When a ship takes 300 or 400 carloads into its hold it may be seen that to load in this slow fashion will take some days. The ports of Buenos Aires and Bahia Blanca are modern and equipped with good docks, hydraulic cranes, steam winches, etc., and soon will be provided with elevators. Several enormous elevators are just being completed in both places, mostly owned by railway companies. The growth of shipping has astonished the most enthusiastic Argentines.

The movement in the port of Buenos Aires twenty years ago was 600,000 tons. In 1902 the total movement in the port was more than 9,000,000 tons. When the present fine granite docks were planned, in 1882 (completed in 1898, at a cost of $36,000,000), it was estimated that they would accommodate a maximum of 10,000,000 registered tonnage, but in 1903, with the large crops of wheat and maize, that figure was exceeded. Only about 300 cars a day can be discharged, and the tracks in the port are often obstructed by 2,000 cars, which are badly needed in the country to bring other train loads of cereals to market. There is much complaint of the slow discharge and the claim is made that the average is not more than 20,000 tons a week. It is calculated that the elevators now building, which will occupy 220 yards of dock space, in which, under the present system, 200,000 tons can be loaded in 280 working days, will be able to load 3,500,000 tons in the same time. The Government was urged to permit the use of the naval station near Bahia Blanca as a commercial port and has finally done so. It is now being remodeled for this purpose at a cost of about $1,000,000 gold. A dry dock has been built there, which is the largest in South America and one of the largest in the world.

### NATURAL ADVANTAGES AND IMPROVEMENTS AT ROSARIO.

The Parana River for some distance above and below Rosario offers unusual natural facilities for loading ships. Its high, precipitous banks, with deep water close to them, enables ships to lie alongside without any dock whatever, and take on their cargoes by force of gravity alone. The bags of grain are slid down to the ships in long portable chutes called "canaletas" (Pl. X), which are hung on wire cables reaching from the loading place on the bank, 40 or 60 feet above, to the deck of the ship lying out in the stream. Ships can load to 16 to 19 feet draft there, but they could load 2 to 4 feet more if it were not for a bar at Martin Garcia, just above Buenos Aires. Unless the water is very high ships drawing more than 18 to 19 feet can not cross there. They must go to Buenos Aires to complete their load. Dock improvements to cost $10,000,000 are now being begun in Rosario,[a] but much objection is made to this enterprise on the ground that the charges will be so high that it will drive shipping to other smaller and less expensive ports. The Government has farmed out the port to the contractors, who are to get their pay by working the port for a long term of years. The Government agrees to keep the channel open in the river below, so that ships of greater draft than at present can get out. It is claimed for the port enterprise that it will make Rosario an actual seaport and enable the grain men there to store, clean, grade, and ship in bulk.

### RAILWAY METHODS AND CHARGES AT PORTS.

The railway companies try to facilitate movement in the ports by distributing cars for loading in the country stations among buyers who have ships waiting, requiring them to state what ship they are loading when they ask for cars. Three days are allowed in the port for unloading cars, after which the railway companies charge $1.70 per car per day. In the port of Buenos Aires six days' free trackage are allowed by the port management; after that a charge of 85 cents per axle per day is made. The cars have two or four axles, according to their capacity. No switching charge is made. Weighing is 12 cents per ton, and loading on shipboard about 18 cents per ton.[b]

In Bahia Blanca, where the port is entirely in the hands of two railway companies, several methods of loading are in use. Steam winches lift the bags from the cars, standing on a steel mole, into the ships lying alongside; men carry the bags on board in the old way or the bags are carried by an endless belt, operated by electricity from the cars about 100 feet to a short chute that lands them on the deck of

[a] These docks were planned, along with other extensive river and harbor improvements, by Dr. E. L. Corthell, an American engineer.

[b] These prices have been somewhat increased lately, owing to strikes among the stevedores.

LOADING GRAIN WITH PORTABLE "CANALETAS" AT ROSARIO.

the ship. The company charges 35 cents per metric ton of 2,204.6 pounds for handling on the dock, and for handling from the deck of the ship, either putting the bags in the hold or cutting them open and letting the contents fall into the hold, there is a further charge of 16 cents per ton. The company also charges 65 cents per ton for switching cars from the city, 4.35 miles, to the commercial port where ships are loaded. Another railway company has a mole, and the charge for switching from the city to this mole over two railways, 9.31 miles, is $1.36 per ton. The capacity of the ten endless belts employed in loading ships is about 1,500 tons per day.

The Southern Railway, which controls the port, is building great elevators there and making very extensive improvements and enlarging the capacity of the port. The same company is just completing still greater works in Buenos Aires, including docks and elevators. In the busy season, when ships are having to wait long for berths, they sometimes take on cargo by lighters at Bahia Blanca, and in the busiest times at Buenos Aires. The charge for lighterage is 30 cents per ton.

### OCEAN TRANSPORTATION.

Tramp steamers of 2,500 to 6,000 tons register usually carry wheat from Argentina to Europern markets. Sailing vessels take but a small percentage. Liners, or mail steamers, take varying quantities, depending on the condition of the meat and butter trade and of the freight market generally. Sometimes they make low rates to fill up, and their service is preferred on account of its promptness. Liners make the voyage in 21 or 22 days. Tramp steamers take about 35 days, and sailing vessels anywhere from 70 to 100. To South Africa, a newly developed Argentine market, the voyage is from 15 to 18 days by steam, and, owing to favorable winds, from 25 to 28 days by sail.

Liners bring general cargoes, usually to Brazilian ports, as well as to Buenos Aires. They stop at Pernambuco, Bahia, Rio de Janeiro, and Santos, Brazil. They return with grain, frozen and chilled meat, and a few other products from Argentina, and coffee from Brazil. Tramp steamers have several ways of getting to "the Plate," as the ports of Montevideo, Buenos Aires, Rosario, and other river ports are called, the name being derived from the Rio de la Plata. They often bring out coal from England; sometimes they have general cargo for Brazil or Argentina, or both, and if not for Argentina, come in ballast from Brazil. Or they may take cargo from England or Europe for South Africa and come across to the Plate in ballast for grain to Europe. Quite often, when the freight market is good, steamers come from England or Europe to Argentina wholly in ballast. Sailers sometimes cross the North Atlantic in ballast or with such cargo as

they may pick up, take lumber from Canada or the United States to Argentina, and grain from there to Europe or South Africa. The demand for tonnage in other parts of the world and the condition of the market, the size of the crop, prices, etc., in Argentina are constantly affecting the plans of steamship owners and the price of ocean freights.

In August, 1903, the price of ocean transportation of grain from Argentina to Europe was from 10 shillings to 18 shillings 6 pence per ton. Expressed in United States equivalents, this would be 6.53 to 12.08 cents per bushel. Rates from Bahia Blanca, as there is never any doubt about water there, are likely to be a shilling or two per ton lower. Rates from Rosario and other up-river points are usually 2 or 3 shillings more per ton than from Buenos Aires, because ships can not complete their loads there, but must proceed to Buenos Aires or La Plata to finish, if they draw more than 18 or 19 feet of water.[a]

## ELEVATORS.

Until very recently only the railway companies have gone into the elevator business in Argentina. A very large steel elevator has been built in Buenos Aires by a Belgian company, to be operated in connection with a flouring mill, the largest in South America, just built in the port by the same company. The Southern Railway is building elevators of great capacity in Buenos Aires and Bahia Blanca, and the Central Argentine Railway Company is building steel elevators in the port of Buenos Aires that will hold 80,000 tons. Rosario has several elevators, but they have not been operated as elevators for several years. Grain men say the charges were prohibitive and that it did not pay to use them. Two were leased to grain firms who used them to sort and clean and dry their own purchases to excellent advantage. Grain men often find it profitable to pay a little more than the weight of wheat will warrant when it is full of light-weight foreign matter; for by cleaning it such wheat will weigh up to a much higher grade. The farmer does not see this point, but goes in for bulk.

[a] In July, 1903, the ocean freight rates on grain, including wheat, from Boston and New York to various European ports were as follows, in cents per bushel:

| | From Boston. | From New York. |
|---|---|---|
| Liverpool | 3.04 | 3.04 |
| London | 3.04 to 4.05 | 3.04 |
| Glasgow | 3.04 | 2.53 |
| Hull | 5.06 | 4.05 |
| Hamburg | 5.06 | 4.76 to 6.55 |
| Rotterdam | 5.06 | 2.75 to 3.75 |
| Marseille | ..... | 5.06 |
| Copenhagen and Stettin | 8.11 | 5.06 to 7.10 |
| Havre | ..... | 5.06 to 9.12 |
| Genoa or Naples | 5.06 | ..... |
| Antwerp | 4.05 | ..... |

The savings to be effected by a system of elevators are being constantly pointed out by Argentine writers. Señor F. R. Cibils, chief of the Division of Commerce and Industries of the Argentine Department of Agriculture, in a recent official report points out some of the gains to be made by having elevators. In substance he says:

Many shipments arrive in bad condition because of having been wet in stations for lack of shelter.

Elevators would save the cost of bags, of which 40,000,000 to 50,000,000 are used every year at 20 to 25 centavos each, or more or less $10,000,000 Argentine paper ($4,400,000 U. S. currency) per year.

Handling in bulk would save cost of labor in piling, would be much quicker, and the grain would be protected in damp weather. In 1899 the loss in piles from rain was estimated at 200,000 tons (734,000 bushels), in round numbers.

A system of warehouse certificates would be a great advantage both to the railways and farmers. With elevators the crop could be moved faster, freight charges could be reduced and cars could be had more promptly, as they would not be held so long. It would facilitate the operations in the ports and reduce the cost of ocean freights. At present the cost of getting to market amounts to 50 to 80 per cent of the value of the grain. The yards at the ports are choked with cars waiting many days for their turn to unload.

Losses are sustained by failure to classify grain. Wet, heated, and fermented grain is put in with good, and the good made equal to the bad.

A law was passed by Congress, January 9, 1900, authorizing the Executive to contract with persons or companies to build elevators in ports or stations, with franchises for not more than forty years when built on Government land. Companies starting to build within two years were to have land rent free for five years. Where there was no Government land power was given to condemn land as for a public utility. Companies organized after five years pay rent fixed each five years, not less than $1 paper per square meter, and not more than $3; no concessions to be more than forty years.

Grain elevators were to be exempt from taxes until 1910 and machinery and iron for their construction and operation were to be admitted free of duty. They must be constructed under the approval of the department of public works and be subjected to Government inspection when in operation. Free land for tracks is granted.

Elevator companies are authorized to issue grain warrants, or warehouse certificates, according to law. This law, authorizing the issuance of a system of warehouse certificates by the custom-houses and by private parties, was passed in 1878, but very little use has been made of it.

## INSPECTION.

No system of Government inspection of grain has ever been tried in Argentina. An effort was made in 1902 to pass a law in Congress for the inspection of cereals, but it failed. Exporters raised a storm of objections, claiming it would mean the appointment of 500 inspectors, inspectors of inspectors, head inspectors, etc., and that it would cost $2,000,000 Argentine paper annually, all of which would have to come out of the price paid to the farmers. The exporters are all opposed to Government inspection, and only in a small minority of cases at present do they care for private inspection. Wheat is almost always sold on "rye" terms, as there is but one system of inspection

in which European buyers have any confidence. Buyers prefer to do their own inspecting and take the chances of getting grain accepted on the other side without its being prejudiced by an unfavorable inspector's report.

In 1894 Indian corn from Argentina arrived in such bad condition in Italy that the Italian Government closed its ports to Argentine maize altogether. After much diplomatic correspondence the Italian ports were reopened to Argentine grain on the condition that all cereals be inspected in the port of exportation by a commission named by the Italian Government.

Wheat is supposed to be inspected by a representative of the buyer in the local station, by means of a "tryer," a pointed tube that is thrust into each bag, bringing out a section of its contents. It requires great dexterity and a high order of expert knowledge to estimate each bag correctly in this hurried manner, and each bag must be so examined to make sure. The inspection is made as the bags are carried by the peons past the inspector, from pile to car, or from one pile to another when ownership changes, and the bags are also weighed on small scales at the same time. (Pl. IX, fig. 1.) The local "almacenero," or general merchant, often buys grain, and sometimes there are local buyers, or the farmer is selling directly to the buyer for export. In any case the buyer must watch sharply or he will buy bad wheat mixed with good, cleverly arranged to deceive him. Where buyers are receiving wheat at 200 different stations it is not possible to have a perfectly competent and reliable man in every station. Some of the most competent wheat buyers spend their entire time in the country stations during the busy season, dividing their attention among several stations and keeping very close watch of the business. They are quite familiar with all the tricks of the trade and can hardly be deceived. These men come from all parts of the world. In the grain trade in Argentina are heard nearly all modern languages; Spanish, Italian, English, French, and German are spoken on all sides. Russians are there, too, but they speak one of the languages just referred to, there being but few Russians.

For the reasons just stated, nearly all grain must be reinspected and to some extent sorted in the port of export, and in the same manner, usually, unless it is to be cleaned or classified and shipped in bulk. Cleaning and classifying are rarely done, but during the past two years a large amount has been shipped in bulk to save the cost of bags, which the farmers buy back at half price, and to save labor and space in loading. In this case the bags are cut open on deck and the wheat allowed to fall into the hold, so it must be inspected beforehand. Occasionally, in Rosario, wheat is poured into ships through long spouts, or covered "canaletas," extending from a warehouse to the ship lying in the stream below. This inspecting, sorting, and weighing, by slow methods, causes more delay and annoyance.

The only grain-inspection system in Argentina that is accepted in Europe is that established and conducted by an Englishman, who served formerly as the English Government inspector of hay, bran, etc., bought in Argentina for the army in South Africa. This gentleman inspects all kinds of grain and hay for foreign buyers, and owing to his long experience in Europe, the United States, Australia, and Argentina, and to his conservative and thorough policy, his certificates are accepted, and cargoes passed by him have so far arrived in good condition. Offices are maintained in the principal ports of export, and inspectors are sent to other ports and to inland stations to receive grain and hay. Another inspection is made of grain and hay received in country stations before it is loaded on shipboard, because of the danger of damage, especially to hay, en route from the country stations to the seaboard. The prices charged for corn inspection range from 1 to 3 cents per bushel, according to the port or place of inspection and the amount of work required. The wheat must be sound, dry, and free from smut and other grains or seeds. The certificate reads: "Fair, average quality at time and place of shipment; shipped in good order and condition." The weight per hectoliter is noted, and if the wheat is specially heavy, even and excellent in quality, the expression "superior quality" may be used instead of "fair, average quality."

When this system of inspection is not used grain is sold from Argentina to Europe on "rye" or "tale quale" terms.

### GRADING.

The only official grading of wheat is done by the Rosario Board of Trade for that market, and it is not very strict. In all other markets each buyer fixes his own standard, which in all cases refers to the natural weight; amount of dirt, broken grains, foreign seeds, etc.; dryness, and freedom from smut. Buyers generally object to strict grading, and prefer to rely upon their own knowledge and judgment in dealing. The chief element in the grading of wheat is its natural weight in kilograms per hectoliter, which is determined exactly in every transaction and guaranteed. Thus wheat ordinarily runs from 76 to 83 kilos per hectoliter, which is equivalent to saying that it is from 59.04 to 64.48 pounds per Winchester bushel. The lower weight is not considered good. Wheat must weigh from 78 to 81 kilos per hectoliter, that is, from 60.59 to 62.92 pounds per bushel, to bring the ruling price for good quality. A large amount of wheat, especially Barletta, weighs 83 to 84 kilos per hectoliter, or 64.48 to 65.25 pounds per bushel, and brings the top price.

The common export classes of wheat are Argentine Barletta, Argentine Russian, and Argentine Hungarian. Each is divided into three

or four grades—especial, superior, good, and inferior. A specimen quotation will show the range of prices of the four grades:

*Prices of wheat in Argentina.*

| Grades. | Price per 100 kilos, Argentine paper. | Price per bushel, United States currency. |
|---|---|---|
| Especial | $7.10 | $0.851 |
| Superior | 6.80 to 6.90 | .815 to .827 |
| Good | 6.40 to 6.70 | .767 to .803 |
| Inferior | 5.80 to 6.30 | .695 to .755 |

These were the current prices in the grain market of Buenos Aires, August 19, 1903, and included all classes, both for export and domestic use.

## EXPORTATION OF WHEAT AND FLOUR.

### GROWTH AND IMPORTANCE OF WHEAT SHIPMENTS.

Argentina has been for nineteen years a surplus producer of wheat. In 1873 she exported her first 5 tons of wheat. In 1876 this had increased to 2,100 tons, but it was not until 1884 that she was able to satisfy her own demands from her own crop and still have a surplus for export. In that year she exported 3,986,623 bushels, though the assertion was still being made that wheat could not be successfully grown in Argentina. In 1903 her exports amounted to about 75,000,000 bushels, worth in the Argentine market during that year 75 to 80 cents United States currency per bushel,[a] or $56,000,000 to $60,000,000, besides all that is consumed at home and the flour and bran exported. The amount of flour exported in 1902[b] was 439,120 barrels, a falling off from the previous year of nearly 50 per cent. In 1903 it was 807,628 barrels. The amount of bran exported in 1902 was 104,677 metric tons, of which 64,003 tons went to Germany and 11,399 tons to the United Kingdom, chiefly South Africa. In 1902 the wheat crop was light and the exportation amounted to only 23,696,070 bushels. It was distributed as follows in bushels:

| | Bushels. | | Bushels. |
|---|---|---|---|
| Germany | 669,941 | United Kingdom | 2,587,723 |
| Belgium | 2,952,180 | Uruguay | 37 |
| Brazil | 4,771,746 | Other destinations | 1,507,138 |
| Spain | 88,515 | For orders | 10,290,852 |
| United States | 35,494 | | |
| France | 224,245 | Total | 23,696,070 |
| Italy | 568,199 | | |

[a] Market Report, September 16, 1903, Buenos Aires.

[b] See statistics on exportation of flour, pp. 95 and 96.

The exportation of wheat from Argentina for twenty-four years, beginning with 1880, has been as follows, in bushels, with Argentine market values expressed in United States currency:

*Exports of wheat from Argentina, 1880–1903.*

| Year. | Bushels. | Value. | Year. | Bushels. | Value. |
|---|---|---|---|---|---|
| 1880 | 48,829 | $45,111 | 1892 | 17,273,394 | $14,181,726 |
| 1881 | 5,772 | 10,772 | 1893 | 37,042,314 | 22,638,829 |
| 1882 | 62,658 | 64,524 | 1894 | 59,092,429 | 26,169,007 |
| 1883 | 2,232,329 | 2,345,128 | 1895 | 37,120,655 | 18,790,144 |
| 1884 | 3,986,623 | 4,188,071 | 1896 | 19,547,489 | 12,380,976 |
| 1885 | 2,884,109 | 3,029,845 | 1897 | 3,742,125 | 3,348,889 |
| 1886 | 1,391,265 | 1,457,515 | 1898 | 23,705,374 | 21,585,989 |
| 1887 | 8,739,987 | 9,181,623 | 1899 | 62,957,093 | 36,745,601 |
| 1888 | 6,574,431 | 7,959,913 | 1900 | 70,902,728 | 46,925,685 |
| 1889 | 837,982 | 1,540,570 | 1901 | 33,226,592 | 25,322,307 |
| 1890 | 12,047,924 | 9,492,535 | 1902 | 23,696,070 | 17,934,423 |
| 1891 | 14,534,016 | 22,902,646 | 1903 | 75,000,000 | 58,000,000 |

## FLOUR PRODUCTION AND SHIPMENT.

The milling industry in Argentina has passed through a period of depression and almost paralyzation, until now it is being established upon a reasonable and firm basis, meeting the conditions under which it must operate in the country. Milling suffers disadvantages common to all industries in Argentina, and some peculiar to itself. It is now an established fact, proved by many bankrupt and idle mills, that only small mills, for local trade, can exist outside the seaports. The reasons for this are various. The business was profitable at first, on a small scale, and many rushed into it; milling was soon overdone, and it was found impracticable to ship any distance by rail. The railway companies do not encourage milling or furnish suitable accommodations or facilities for shipping flour. Fuel, oil, and other requisites are very expensive.

### TAXES ON THE FLOUR INDUSTRY.

High taxes have done much to kill the milling industry. It is not the only industry that otherwise might have thrived, but was extinguished, owing largely to high taxes. It is a common short-sightedness in South America to strangle development with increasing taxation. The producers, the workers, the traders, are required to carry the burden of taxation, while the land tax is $6 per $1,000 of valuation, with very low valuation. This is due to the fact that the taxing power is in the hands of those who own the land, while the industrial and commercial classes are comparatively but little represented. For instance, the annual fixed taxes on a flour mill of a capacity of 200 barrels per day, in the Province of Buenos Aires, are as follows, in Argentine paper money:

| | | | |
|---|---|---|---|
| Direct tax | $720 | Tax on steam engine | $80 |
| License | 500 | Inspection of stables | 18 |
| Duty on analysis | 400 | Testing weights and measures | 60 |
| Drains and water supply | 336 | | |
| Tax on carts | 615 | Total | 3,065 |
| Cleaning and lighting | 336 | | |

This amount, equal to $1,348 United States currency, does not cover all the taxes, for there are numerous other smaller ones, and new ones are likely to be added occasionally. The tax on this small mill is equal to the taxes borne by land valued at $513,000 and really worth two or three times as much.

In the Province of Santa Fe the milling industry has been threatened with ruin during the past year by the system of taxation there. The situation there is described by the Buenos Aires Standard, April 19, 1903, as follows:

The milling industry of Santa Fe, like the sugar industry of Tucuman, is suffering from a "crisis of progress." It has grown "pari-passu" with the enormous and rapid development of wheat production, and at first, having no serious opposition to encounter in this Republic and none in Brazil, the profits were great, with the natural consequence of the continual establishment of new mills until the production of flour exceeded the home consumption; but, for a time, an outlet was found for the surplus in exportation to Brazil.

This career of prosperity has now been checked; for a Brazilian milling industry has been created, and, to promote its growth, the foreign flour imported is subjected to a much higher duty than is imposed upon the equivalent quantity of wheat. At the same time the government and legislature of Santa Fe have adopted the impolitic system of burdening what should be the staple industry of the Province by excessive and inequitable taxation imposed in different forms. First, the millers have to pay 12 cents for every 90 kilos of flour elaborated, which is equivalent to the tax that is imposed upon 150 kilos of wheat, if sent out of the Province, although only 130 to 135 kilos of wheat are required for producing the said quantity of flour. This tax is payable whether the wheat from which the flour is made has been grown in Santa Fe or elsewhere, although the wheat of other Provinces exported from the ports of Santa Fe is free from the tax. Thus the Brazilian miller is actually "protected" to the extent of 12 cents per 90 kilos of flour by Santa Fe fiscal legislation, to the prejudice of the millers of the province.

This is not all. The miller has to pay a "patente" (license) tax for permission to carry on his business; another for the person employed to buy wheat direct from the farmer; and still another for the person sent to receive the wheat on the farm; and these "patentes" are "personal" and have to be paid for every partner of the firm and for every person employed as mentioned.

The Santa Fe miller is handicapped additionally by the fact that flour may be imported into the Province from Buenos Aires, Cordoba, or Entre Rios without paying any tax; but if he send his flour into either of those Provinces he has to obtain a "patente" in such province, and so, also, must the baker residing therein who imports flour direct from a Santa Fe mill.

These grievances were recognized by the Provincial Government, and in 1899 it obtained from the legislature a law for giving a bounty upon flour exported; but this has not been paid since September, 1901, all the revenue having been applied to other purposes.

The millers now ask that the payment of the bounty may be resumed or that all the taxes on flour and on wheat converted into flour may be suppressed.

There is, however, a considerable difference in the alternative modes of relief solicited; for, as the petition shows, the bounties paid did not exceed in the aggregate $50,000 a year, while the tax varies from $300,000 to $360,000, of which it is estimated 25 per cent is paid in respect to flour made from the wheat of other Provinces.

It is alleged in the petition that the capital invested in the Santa Fe milling

industry amounts to $30,000,000, that it is now unproductive, and that one-half of the mills formerly working have been necessarily closed.

As regards the bounty, it is decidedly objectionable in principle, and it can not make the difference between prosperity and ruin; for it is equivalent to only 16½ cents per annum for every $100 of capital invested, while the tax is equivalent to 1 per cent per annum on the capital.

### MILLS AND THEIR CAPACITY.

When wheat growing began to develop, in 1880, the milling industry developed along with it, and more than 300 mills, an increase of nearly 100 per cent, were built during the next fifteen years. They were divided in location as follows:

*Development of milling industry in Argentina.*

| Location. | Mills in 1880. | Mills in 1895. |
|---|---|---|
| River Provinces, including the Federal capital, Buenos Aires, Santa Fe, Entre Rios, and Corrientes | 80 | 270 |
| Central Provinces, including Cordoba, San Luis, and Santiago del Estero | 60 | 93 |
| Andine Provinces, including Mendoza, San Juan, La Rioja, and Catamarca | 119 | 160 |
| Northern Provinces, including Tucuman, Salta, and Jujuy | 84 | 117 |
| National Territories, Neuquen, and Rio Negro | 10 | 19 |
| Total | 353 | 659 |

These 659 mills were divided as to power as follows:

| | |
|---|---|
| Steam | 234 |
| Water | 303 |
| Steam and water combined | 17 |
| Animal | 105 |
| Total | 659 |

The total horsepower was estimated at 10,500 and the capital invested $11,880,000.

That the industry was badly overdone is shown by the large number of mills now idle or in ruins. A fine mill at Carcaraña, where there is a good water power, has been idle for a number of years, and it does not find a purchaser at $125,000, where a few years ago $1,000,000 cash was offered for it.

The producing capacity of the mills in Argentina was stated by the Argentine Department of Agriculture for the year 1901 at 13,497,551 barrels, the internal consumption at 5,061,582 barrels,[a] while the exportation was only 806,951 barrels. In 1902 the exportation had fallen to 439,120 barrels.

This production of flour was increased in 1903 by the erection of new mills in the ports. A Belgian company has recently completed

[a] There has been no census in Argentina since 1895, but the population is between 4,500,000 and 5,000,000. The consumption of flour per capita, therefore, is more than a barrel of 196 pounds, or a trifle more than that of the United States.

a mill in the port of Buenos Aires with a daily capacity of 2,500 barrels, the capacity of which will soon be doubled. This mill works in connection with large steel elevators in the port, owned by the same company, which has just been granted a concession to build elevators in country stations and ports. Several large mills are working profitably in the large centers, where shipping facilities are good and the local consumption large. These mills are fitted with the best modern machinery from England, the United States, Germany, France, and Austria. The one just referred to was equipped by an English contractor, who put in the machinery he considered best, as much English as possible, but various items from other countries, especially from the United States.

It is evident that the future of milling in Argentina will be confined to the great centers, the chief river and ocean ports, as far as export business is concerned, and a great part of the production for home consumption. It is only by the most economical management and production on a large scale that the business can be made to pay commercially. The small gristmills will continue to operate in the country to supply local needs, but they will cut no figure in a commercial sense. Many mills in the interior with capacity beyond local demands have been abandoned and either left to go to ruin or the machinery moved to a more favorable location.

### KINDS OF FLOUR, AND PRICES.

The Argentines have excellent flour and first-class bread in the cities below Corrientes. Three kinds of flour are commonly made:

*Harina cero* (*flour No. 0*).—Made from the coarse groats of the first milling, and fine groats from the first milling and from reground groats.

*Harina especial* (*special flour*).—The remainder of the milling, without the tailings of the bran, with the last remilling of the flour and the flour from the last milling of bran.

*Harina segundo* (*second flour*).—Consists of what is secured by the remilling of the special flour, and from the last passage.

In some mills a flour called "entera," or whole wheat flour, is made by a mixture of No. 0 and special, taking out the second and the residue.

Flour is sold in Argentina by the 10 kilos (22.046 pounds). The range of prices for the three grades is about as follows, per 10 kilos expressed in United States money, though of course these prices fluctuate considerably: Cero, $0.4928 to $0.5060; especial, $0.418; segundo, $0.352.

The estimates of the percentage of flour obtained from wheat range from 62 to 75 per cent. Probably 64 to 68 is a fair average estimate. Barletta wheat of good quality will give, it is claimed, 70 to 75 per cent; but French or other lighter wheat is often mixed with it, lowering its strength and weight, but giving it a lighter color.

Flour is put up for domestic use in canvas sacks, made in the country from imported material, and holding 90 kilos, or 198.41 pounds. For exportation to Brazil, Argentina's chief foreign market for flour, it is put up in lighter cotton sacks holding 22 or 44 kilos, equal to 48.5 or 97 pounds.

Bran and other by-products are disposed of chiefly by exportation to Europe, England, and South Africa to good advantage.

### EXPORTATION OF FLOUR.

Brazil is the only important export market for Argentine flour at present, and in this she is hampered in various ways. Transportation, which is entirely by sea, is high. The Brazilian Government is inclined to put obstacles in the way of the trade, as a protection to Brazilian mills. Brazilian sanitary regulations, prohibiting the importation of flour in bags on the ground that it might bring disease, have at times stopped the business altogether. But the Argentines make up for this by selling large quantities of wheat to Brazil. Most of the flour made in Brazil is from Argentine wheat, though it is often mixed with wheat from the United States, which millers say improves it. Flour exports to Europe have thus far been chiefly experimental, though now, with large mills entering the business, trade in that direction may be developed.

The following table shows the exports of flour from Argentina for twenty-four years from 1880 to 1903, inclusive:

*Exports of flour from Argentina, 1880–1903.*

| Year. | Barrels. | Value. | Year. | Barrels. | Value. |
|---|---|---|---|---|---|
| 1880 | 16,009 | $97,171 | 1892 | 212,014 | $988,200 |
| 1881 | 14,481 | 102,128 | 1893 | 426,534 | 1,272,439 |
| 1882 | 6,173 | 37,816 | 1894 | 458,444 | 984,233 |
| 1883 | 54,489 | 331,091 | 1895 | 606,659 | 1,816,483 |
| 1884 | 42,004 | 252,257 | 1896 | 581,879 | 1,881,322 |
| 1885 | 83,764 | 503,050 | 1897 | 466,149 | 2,327,309 |
| 1886 | 59,189 | 350,109 | 1898 | 359,180 | 1,536,757 |
| 1887 | 60,751 | 364,843 | 1899 | 668,848 | 1,870,441 |
| 1888 | 71,902 | 616,870 | 1900 | 575,928 | 1,657,952 |
| 1889 | 37,803 | 492,973 | 1901 | 806,951 | 2,616,402 |
| 1890 | 135,177 | 579,863 | 1902 | 439,120 | 1,543,546 |
| 1891 | 78,909 | 541,587 | 1903 | 809,628 | ..... |

DESTINATION OF FLOUR EXPORTS.

The flour exported from Argentina during the past five years was distributed as follows:

*Destination of flour exports from Argentina.*

| Country. | 1898. | | 1899. | | 1900. | | 1901. | | 1902. |
|---|---|---|---|---|---|---|---|---|---|
| | Barrels. | Value. | Barrels. | Value. | Barrels. | Value. | Barrels. | Value. | Barrels. |
| Belgium | 112 | $463 | 157 | $415 | 7,604 | $22,579 | ..... | ..... | ..... |
| Bolivia | 742 | 3,212 | 675 | 1,881 | 562 | 1,611 | 967 | $3,084 | ..... |
| Brazil | 344,080 | 1,470,664 | 606,265 | 1,698,372 | 426,725 | 1,275,295 | 766,200 | 2,483,455 | 371,621 |
| Chile | 22 | 91 | 742 | 1,880 | 382 | 1,068 | 1,440 | 4,589 | ..... |
| France | 1,485 | 6,369 | 3,149 | 9,221 | 337 | 834 | 2,396 | 7,617 | 1,935 |
| Germany | ..... | ..... | 472 | 1,340 | 6,513 | 17,184 | 22 | 70 | 990 |
| Italy | 1,867 | 7,645 | 12,294 | 39,497 | 169 | 521 | 56 | 173 | 11 |
| Netherlands | ..... | ..... | ..... | ..... | 1,417 | 4,373 | 56 | 188 | ..... |
| Paraguay | 4,792 | 21,836 | 8,054 | 22,051 | 9,077 | 26,170 | 10,663 | 34,739 | ..... |
| Peru | ..... | ..... | ..... | ..... | 1,350 | 3,011 | ..... | ..... | ..... |
| South Africa | 34 | 139 | 7,626 | 20,278 | 49,997 | 113,112 | 3,937 | 12,834 | ..... |
| Spain | ..... | ..... | 225 | 563 | 2,430 | 5,990 | 574 | 1,961 | 1,012 |
| United Kingdom | 2,317 | 9,978 | 26,613 | 68,385 | 50,143 | 131,974 | 3,419 | 11,230 | 39,593 |
| United States | ..... | ..... | ..... | ..... | 1,035 | 3,210 | ..... | ..... | ..... |
| Uruguay | 1,608 | 6,523 | 765 | 1,941 | 13,992 | 41,068 | 12,193 | 40,085 | 877 |
| Various | 2,171 | 9,837 | 1,811 | 4,617 | 4,195 | 9,952 | 5,028 | 16,487 | 23,081 |
| Total | 359,180 | 1,536,757 | 668,848 | 1,870,441 | 575,928 | 1,657,952 | 806,951 | 2,616,402 | 439,120 |

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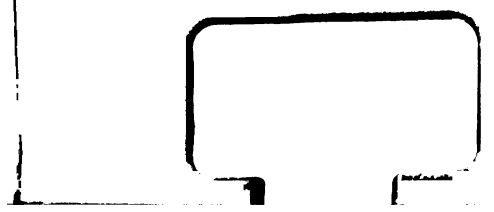
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